Vol. 1

A Textbook of Rasashastra evam Bhaishajyakalpana

Ayurvediya Aushadhi Nirmana Vigyana (Ayurvedic Pharmaceutics)

AS PER THE NCIM SYLLABUS

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CHAUKHAMBHA ORIENTALIA

ABBREVIATIONS

Anandakanda	:	A.K.	Raja Nighantu	:	R.Ni.
Arunadatta	:	A.D.	Rasa Prakasha Sudhakara	:	R.P.S.
Astanga Hridaya	:	A.Hri.	Rasa Ratna Samucchaya	:	R.R.S.
Astanga Samgraha	:	A.Sam.	Rasa Tarangini	:	R.T.
Ayurveda Prakasha	:	A.P.	Rasa Yoga Sagara	:	R.Y.S.
Bhaishajyaratnavali	:	B.R.	Raseshwara Darshana	:	R.D.
Bruhat Rasa Raja Sundara	:	B.R.R.S.	Rasendra Chudamani	:	R.Chu.
Chakradatta	:	Cha.Da.	Rasendra Mangala	:	R.M.
Chakrapani	:	C.P.	Rasendra Sara Sangraha	:	R.S.S.
Charaka Samhita	:	Cha.Sam.	Shabda Kalpa Druma	:	Sha.Ka.Dr.
Chikitsa Sthana	:	Chi.St.	Sharangadhara Samhita	:	Sha.Sam.
Dravya Guna Vignana	:	Dra.G.Vi.	Siddhi Sthana	:	Si.St.
Kalpa Sthana	:	Ka.St	Sushruta Samhita	:	Su.Sam.
Khasyapa Samhita	:	Kha.Sam.	Sutra Sthana	:	Su.St.
Madhyama Khanda	:	Ma.Kha.	Uttara Khanda	:	U.Kha.
Nidana Sthana	:	Ni.St.	Uttara Stana	:	U.St.
Prathama Khanda	:	Pra.Kha.	Vimana Sthana	:	Vi.St.
Rasa Chintamani	:	R.Chi.	Yogaratnakara	:	Y.R.
Rasa Hridaya Tantra	:	R.H.T.	Siddha Bhaishajya Manimala	:	S.B.M.
Rasa Jala Nidhi	:	R.J.N.	Siddha Yoga Sangraha	:	S.Y.S.
Rasa Kamadhenu	:	R.K.D.	Siddha Yoga Manimala	:	S.Y.M.

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CHAPTER 1

CHRONOLOGICAL DEVELOPMENT, SIGNIFICANCE & SCOPE OF RASASHASTRA AND BHAISHAJYA KALPANA

PAPER 1

Contents

- Definition, Chronological Development, Significance and Scope of Rasashastra and Bhaishajya Kalpana.
- Concept of Rasashala, Rasa-Mandapa and Bheshajagara
- Concept of Rasa-Rasayana
- Briefing on "Indians are the First to Prepare Metal Based Medicines"
- Recent Development in Ayurvedic Pharmaceuticals

Learning Outcome

At the end of this chapter, students can able to

1. Explain historical evolution of Ayurvediya Aushadhi Nirmana and Aasashastra
2. Describe about contribution of Nagarjuna Acharya to Rasashastra
3. Enlist important classical texts of Rasashastra and describe their unique features in short
4. Describe recent development in ayurvedic pharmaceuticals viz, modern equipments, new dosage forms, pharmaceutical modification techniques
5. Define rasa and rasayana and describe difference between rasa and rasayana

Rasashastra

Introduction

Rasashastra is a science which mainly deals with processing of parada (mercury) and its use in different forms to get therapeutic effect, for rasayana purpose, for dehavada (retaining good health and virility) and dhatuvada (conversion of lower metals into higher metals like gold and silver). Parada is the core element of this science and so it has been named after it. The ultimate goal of rasashastra is to preserve and prolong life, with the help of processed mercury.

Definition and Etymology of Rasashastra

The term 'Rasashastra' includes two words 'Rasa' and 'Shastra'.

रसत्वातद्रवत्वात् रसः (Rasarnava)

As mercury is in the liquid state, it is called as the 'Rasa'

रसनात् सर्वधातूनां रस इत्यभिधीयते। जरारुङ्मृत्युनाशाय रस्यते वा रसो मतः।। (R.R.S. 1/77)

It can liquify or engulf other metals and minerals into it. So it is called rasa, also its consumption destroys old age, disease and death, hence it is termed as "rasa".

रसनादभ्रकादीनां धातुनां कीर्तितो रसः। (R.T. 5/2)

Mercury does the as similation of Abhraka and other dhatus into it, therefore it is called as Rasa.

अथ देहरसो यस्माद् रससेनायमुच्यते। (रसार्णव)

According to rasashastra, 'parada' (mercury) and 'gandhaka' (sulphur) are the most important elements as they represent lord shiva and goddess parvati respectively. So in this context the word 'rasa' denotes the essence or the shukra of lord shiva.

Rasa is a Sanskrit term which has several meanings in different contexts.

- It literally means "sap," "essence" or "fluid."
- Rasa is the essence of food which is termed as Ahara rasa
- Rasa is the first dhatu among the Saptadhatus (Rasa, Rakta, Mamsa, Medha, Asthi, Majja, Shukra)
- Rasa is the taste perceived by the rasanendriya which are 6 in numbers- Madhura, Amla, Lavana, Katu, Tikta, Kashaya
- Rasa is the extract of the herbal drugs which is also known as swarasa.
- Rasa also refers to water and nectar in some contexts
- According to vedic literature, Rasa is Brahma- the creator
- In spiritual tradition, this term refers to the essence of human experience; the emotions that govern human life. In the practice of yoga however, only three of these rasas are considered to be fundamental -Veera rasa, Shanti rasa, Shringara rasa those represents the energy of human emotions. This energy, whether negative or positive, directly affects one's spiritual and physical health. There are nine basic human emotions, those rasas are: Sringara, Hasya, Adbhuta , Shanti, Raudra, Veera, Karuna, Bhayanaka and Bhibhatsa.

But here this term 'Rasa' indicates to liquid metal "MERCURY", which has been used by our ancient AAcharyas to prepare different compound formulations to cure many diseases and also to maintain longevity of health to attain siddhi.

Shastra means the science which enlightens or the knowledge ('**शास्त्रं ज्योतिः प्रकाशार्थम्**'). So the term Rasashastra literally means the "Science of Mercury".

रसोपरसलोहानि यन्त्रादिकरणानि च ।।
शुद्ध्यर्थमपि लोहानां तन्त्रादिकरणानि च ।
शुद्धिः सत्त्वं द्रुतिर्भस्मकरणं च प्रवक्ष्यते।। (R.R.S. 1/9-10)

The Rasashastra includes the description of the following aspects:

- Rasa (parada) and other drugs categorized under uparasa, loha etc., their varieties, characteristics, processing techniques, properties and therapeutic uses
- Various apparatus like yantras, putas, musha, koshti etc., used in the processing of rasadravyas
- Methods of processing of parada and other metals and minerals
- Different techniques used in the purification of dhatus (metals)
- Preparation of various dosage forms like dhruti, bhasma, satva and many other formulations

The two Main Objectives of Rasashastra are:

1. Dhatuvada or lohaveda
2. Dehavada

Dhatuvada is to convert the lower metals to Gold or Silver and Dehavada is achieving the positive health and leading a long life without being affected by any diseases and to attain moksha.

Though it has been said that Dhatuvada was the initial aim of rasashastra, later dehavada was given more importance, so as to attain the healthy life which is the base for attainment of moksha. The scope of rasa shastra is not limited to transmutation of metals. It is also to make the human body as strong as iron through therapeutics, thereby removing impediments in the road to salvation.

Chronological Development of Rasashastra

History has a records of a field and its current improvements or new inventions. It helps in adapting concepts in the present scenario & improve their scientific understanding. Rasashastra is one such branch of medical science, which is growing day by day with the help of past and present scientific knowledge. History of any science is mainly studied with the help of documentation over the period of time. In the context of Rasashastra the literary works of many authors are the documentation which provide the information about the existence and growth of Rasashastra in particular period of time.

The actual development of Rasashastra for medicinal use began in 2nd and 3rd century CE and its peak period of development was from 8th century onwards. Though history of Rasashastra dates back even before 300-400 B.C.E., when Koutilya Arthashastra was documented, more valuable additions on the subjects were recorded during 12th-16th century CE.

After 16th century CE the knowledge appears stagnant and after 19th century CE,

by learning the science like chemistry, it is again in developmental stage. Now with the advent of modern technologies, validation of this science is in progress and further are advancements needed to bring remarkable glory to Rasasahstra.

History of rasashastra can be divided into three distinct periods- Vedic period, Samhita period and Post-samhita period. The Post-samhita period is dominated by the renowned alchemist Siddha Nagarjuna.

It is evident that the roots of rasashastra can be traced back to veda or even earlier period.

Rasashastra in Prevedic Period

- In pre-historic period (6000-2000 BCE), usage of musha (mud vessels, crucibles etc.) for various processing methods, like extraction of metals from their ores (E.g. Cast iron) were evidenced.
- During indus valley civilization (2500-1800 BCE), knowledge of chemistry; usage of three types of furnaces; knowledge of metals like gold, copper, tin, lead, iron etc.; copper and bronze was evident and they were used for household implements;
- The evidences of indus valley civilization found by excavation reveals the usage of metals and minerals by those people. Mortars made up ofgypsum, lime and sand materials were found.
- Precious stones (gems) were used for making ornaments; usage of glass, silica, aluminum, iron, magnesium oxide, lime etc.; usage of shilajatu as a strength promoting agent were also observed.
- In iron age, which was followed by stone age, people were using metals for different purposes.
- In Harappa and Mahenjodaro, it was found that people were using metallic articles like axes, daggers, arrow-heads, utensils etc., mainly made of copper, bronze, gold, silver and lead.
- Many other materials like bitumen, cinnabar, different kinds of gem stones were also found.
- The practical arts of pottery making and painting; metallurgical practices of forging, casting, smelting, were known to the people of that period.

Rasashastra in Vedic Period

- During this period, there was a positive progress in the metallurgical and chemical practices. The references of many metals and minerals are seen in all the four vedas.
- In Rigveda, the earth has been described as "हिरण्यगर्भ: समवर्तताग्रे" suggesting their awareness regarding swarna and other metals.

- They knew the uses of gold, copper, iron and bronze and they made use of these in the wheels of chariots for transport and warfare.
- There is a reference of prosthetic surgery done by Ashwini kumars on Vishphala whose injured hip was replaced by Lohadhatu.
- There is a mentioning of lord Shiva, Rudra and others as Rasa chikitsakas.
- In Rigveda, the word dhatru is used instead of the word dhatu because it is extracted form rather than natural form which suggests their knowledge regarding dhmapana kriya (extraction of metals).
- In Yajurveda, there is a mentioning of 6 metals- hiranya (gold), ayas (copper), shyama (iron), seesa (lead) and trapu (tin).
- In Atharvaveda, there are certain hymns which includes invocation to pearl, shell and gold.
- The name harita was used for gold; rajatha and arjuna for silver and lohita for copper. Tala, shila, mani, shanka, pravala and other khanija and pranija products were also used. Seesa was used to kill wild animals.

Kautilya Arthashastra

- This is composed by Chanakya, a great academic, economical and political master of gupta period in 4th century BCE.
- In this period, lohavidya was at its peak level of development. Several references of use of metal and minerals for purposes of preparation of utensils, armory and some medicinal objectives found in Kautilya Arthashastra.
- Shodhana and mardavakara processes of dhatus were mentioned in this work. Identification of Dhatu and Ratnas are described.
- Seven types of loha are mentioned viz Kalayasa, Tamravritta, Kansya, sisa, trapu, vakrintaka and aarkoot.
- Three sources for occurence of mukta mentioned as shankha, shukti and prakirna.
- Metals and minerals were used both externally and internally for the preservation as well as promotion of positive health and cure of diseases.
- At that time, three types of suvarna were used, among which suvarna made from rasa i.e. Parada is mentioned as rasavidha. This shows that even prior to his time this type of gold was available in the market and people knew the techniques of conversation of base metals into noble metals with the help of mercury.
- Suvarna shodhana is mentioned and for suvarna vikrutikarana, hingula was used.

Rasashastra in Samhita Period

After vedic period, the era is considered as Samhita period during which three

main treatises (brihatrayees) Charaka Samhita, Sushruta Samhita and Ashtanga Sangraha were written. They emphasised mainly on the drugs of herbal origin, but still the usage of metals and minerals are observed in some contexts-

Charaka Samhita

- Charaka mentions 6 dhatus- Swarna, Rajata, Tamra, Naga, Vanga and Loha for both internal and external administration in the form of raja or churna or ayaskriti.
- Minerals like Tuttha, Svarnamakshika, Kasisa, Shilajatu, Haratala, Manahshila, Gandhaka, Anjana, Pushpanjana, Rasanjana, Gairika, Sphatika have been prescribed in combination with herbal drugs for the use as external application in many skin diseases and for internal in pandu, kamala and for rasayana.
- Mandoora or rust of iron and pyrites have been told as ingredients of vatis which is prescribed for internal administration. Ex: mandoora vajra vataka.
- Shankha, Shukti, Pravala, Pushparaga, Manikya, Sphatika and other drugs have been mentioned and they are used as ornaments for their prabhava effect.
- In shwasa and raktapitta chikitsa, Charaka has mentioned muktadya churna which contains most of all gem stones and dhatus.
- In siddhisthana, the use of lohas has been mentioned for preparation of bastinetra.
- Use of swarna for prashana and pumsavana has been explained in Charaka samhita.
- Lohadi rasayana is indicated for rasayana karma
- Tamra used in garavisha for vamana and suvarna with madhuasvishagna yoga
- Vajra, markata, vishamushika, vaidurya are used for sarpadanshanivarana
- Manahashila used as pradhamana nasya in kaphaja pratishyaya.
- Dhatus were administered in the form of powder (raja) and the concept of bhasmas was not developed during the classical age.

Sushrutha Samhita

- Sushrutha was the first person who has mentioned Phenashma and Hartala as dhatuvisha.
- There is one reference of parada though somewhat vague, which tells the use of parada for external use only.
- Sushrutha has dealt mainly with herbal drugs. There are only limited references about Khanija drugs. He had told 6 dhatus namely- Vanga, Naga, Tamra, Rajata, Krishnaloha and Swarna and their ayaskriti are recommended for use as drugs.
- Among minerals Sushrutha has made use of Tuttha, Kasisa, Sasyaka, Gairika, Haratala etc., as medicaments for external application.

- Various dhatus are mentioned in trapvadi gana and usakadi gana.
- Several yantra and shastra used in surgical process are made of different kinds of metals or alloys.
- Acharya Sushruta mentions the pakas namely sthalipaka. etc.
- Internal administration of anjana is indicated for the first time in Sushruta Samhita and various dhatus are mentioned for internal administration in dravya sangrahaniya adhyaya.
- Two bhedas of lauha is described in Sushruta samhita- tikshnalauha and kala lauha.
- Gandhaka is used in mahavajra taila in kushtha chikitsa.
- The concept of puta appears to be developed for the first time by Sushruta in the reference of tuvaraka rasayana. Here, the word bhasma refers to only the ash of vegetable drugs. The pulp of tuvaraka is burnt in closed vessel without letting out the smoke (antardhuma method).

Ashtanga Sangraha and Ashtanga Hridaya

- Various minerals like tuttha, gairika, manahshila, haratala, kasisa etc., are recommended as an external application for vranas.
- Many preparations of gold, silver, copper, iron, tin and lead have been described.
- There is a mentioning of ratnas in ashtanga hridaya like manikya, mukta, pravala, marakata, vajra, vaidoorya, suryamani, sphatika.
- The shukla varga dravyas like shankha, shukti, varatika, samudraphena are also mentioned in the texts.
- In ashtanga sangraha and hridaya, the footsteps of marana concept is seen where the use of ghatimusha and andha musha for the dhamana is quoted.
- The process of dhatubhasma was mentioned during the time of vriddha vagbhatta. For lohamarana Bhanupaka vidhi was introduced.
- In uttaratantra of ashtanga sangraha, there is a preparation mentioned for the shukradhatu vriddhi which contains the mineral ingredients like shilajatu, loha churna, parada, swarnamakshika
- Rasa, veerya, vipaka of dhatus have described in ashtanga sangraha
- Use of tamra, suvarna, swarnamakshika was mentioned in ashtanga hridaya
- Internal administration of parada was mentioned for the first time in ashtanga sangraha rasayana prakarana.
- Siktha, sindoora, tuttha, tarkshya are used in the preparation of taila form for treatment of vicharchika.

Rasashastra in Post-Samhita Period

From 8th century onwards we find that the 'dehavada' part of rasayana shastra developed rapidly though the name Rasashastra remained. Newer drug forms were incorporated in study. Different methods of processing mercury and other metals were established. The books written in later period i.e., 13th century to 14th century onwards appear to be mere compilations from the older texts with little or no inclusion of new ideas. After 14th century the knowledge stagnated and after learning the sciences like chemistry, again it attained developmental stage.

- Acharya Gorakshanatha made the Khechari Gutika and Suvarnanirmanartha-gutikakalpa.
- Rasa Ratna Samucchaya which is well known comprehensive treatise of Rasa Shastra has many Rasa kalpas description. Scattered knowledge of Rasashastra was well compiled by Vagbhata. It is the best available text on Rasashastra which describes both pharmaceutical and therapeutical aspects. It is a compilation text but has its own specialty and consequence.
- Rasa Hridaya Tantra is a unique text among a huge number of rasa literatures, which gives elaborate description of 18 special mercurial processing techniques (Asta dasha parada Samskara). This manuscript is presented with a guideline, how to make Mercury competent for transmuting base metals into a noble one and to produce therapeutic benefits with them.
- In Rasa Ratnakara, the author explained krutrima Manikya nirmana and Indranila nirmana.
- The text Anandakanda gives an elaborate description of Rasa Shastra. Dehavada as well as Lohavada concept of Rasa Shastra has been described in detail.
- Apart from these, many authentic works of Rasashastra were written during this period. Rasendra Mangala, Rasa Ratnakara, Kakshaputa, Rasarnava, Rasahrudayatantra, Goraksha Samhita, Rasendra Chudamani, Rasapraksha sudhakara, etc. were written during this period, where abundant and detailed explanation about Rasadravyas, Shodhana, Marana and therapeutic usage is mentioned.

Modern Period

- Text books like Bhaishajya Ratnavali, Rasa yoga Sagara, Ayurveda Prakasha, Parada Vijnaniya, Rasa jala nidhi etc were written during this period, with the mere compilation of previous works and addition of their contribution.
- During this period, many advances in the Rasashastra field took place, on a scientific basis.

- Since the 17th Century, the whole World witnessed the advent of modern materialistic sciences like Physics, Chemistry etc. that definitely had an impact on Rasa Shastra. So in the books of Rasa shastra written during this period, amalgamation of modern chemistry and Rasa Shastra was observed.
- In the texts like Rasatarangini, Rasamritam etc., the knowledge of modern chemistry is used for re-classification of drugs. Sulphuric Acid, Nitric Acid, Citric Acid etc. are even advocated for preparation of different drugs.
- The authors had mentioned only those procedures which are realistic and feasible in present scenario and adopted some new and contemporary concepts.
- In Rasamrita, incorporation of some unani drugs are also found.

Rasashastra- in recent times

- The Guru Shishya school of thought was replaced by college and schools.
- Rasashastra got a modern outlook with the invention of modern technologies.
- The matter related to the usage of metal and mineral based preparations for the therapeutic purpose is one of the most controversial issues of the present day.
- Several studies carried out over the years and many recent studies show that toxicity is not normally observed at the therapeutic dose level if used in an appropriate manner after proper processing.
- In present days, the research is concentrated upon safety and efficacy of Rasadravyas, Application of modern instruments, replacing the traditional method of Shodhana and Marana, animal experimental and clinical trials of Rasa dravyas.
- Knowledge of chemistry and its allied branches like phytochemistry, analytical chemistry, various instruments, and their knowledge in drug production, application of all these factors to Rasashastra are proving useful in understanding the secrets of Rasashastra.
- Many mineral and metal based preparations are standardized and mentioned in Ayurvedic Formulary of India.
- Microscopical, Chemical and Analytical studies are on going to understand the structure, chemical composition, particle size etc of the Rasadravyas.

Nagarjuna

Rasa siddha Nagarjuna is known as first Acharya of Rasashastra. The systemic evolution of Rasa Shastra took place during the time of Nagarjuna. In his period, number of most valuable Rasa preparations along with their pharmaceutical processing techniques have developed. He learned knowledge from Acharya Sarabha in Nalanda Vidyapitha. He knows about Mayurividya and krutrima Swarna Nimana from parada.

References about many Nagarjuna are available in the history of Indian sciences-

- The author of the text Rasendra mangalam and Rasa ratnakara
- The editor of Sushrutha samhita
- The originator of Shunyavada and Mahayana cult following the philosophy of Bauddha madhyamika during 2nd century
- Arya Nagarjuna whose life story was narrated in Pandita Kumarajeeva written in 401 CE.

But, here Nagarjuna refers to the author of the Rasendra mangala and Rasa ratnakara. The evolution of Rasa shastra as a specialized branch is traced to the great Sage Nagarjuna, Who is considered as 'Father of Rasa shastra'. Rasa Shastra reached its highest peak of glory during the time of great Acharya Nagarjuna. Acharya in his texts mentioned that he has collected few references from other authors, which proves the presence of other Rasashastra subject experts before and during his time. But the science have come into its proper existence with its scientific classification and documentation around 8th century.

Nagarjuna is also known for his extraordinary acumen in processing mercury with respect to its alchemic and therapeutic use. Nagarjuna proclaimed "सिद्धे रसे करिष्यामि निदरिद्रयमिदं जगत्।"- meaning that I am experimenting with the mercury to eliminate poverty from this world. The main foundation being the concept that the objective of the science of mercury is not limited to Alchemy (Dhatuvaada) but also to maintain health and strengthen the body for achieving Mukti i.e. ultimate salvation- the concept is incorporated in the philosophy of Raseshvara Darshana and this is stated as :

"न च रसशास्त्रं धातुवादार्थमेवेतमिन्तव्यं, देहवेधद्वारा।
मुक्तेरेवपरम् प्रयोजनत्वात्" (Raseshvara darshana)

Writings of Siddha Nagarjuna

- Rasendra Mangalam
- Nagarjuna Tantra
- Rasendra Chintamani
- Rati Shastra
- Louha Shastra
- Yoga Sagara
- Yoga Shataka
- Arogya Manjari
- Kakshaputa Tantra

Important Yogas of Nagarjuna

- Kanaka Sundara Rasa
- Khageshwara Rasa
- Nagarjunabhra Rasa
- Arogya Vardhini
- Laghu Siddhabhara
- Agryarasayana

Some Yogas in the Name of Nagarjuna

- Nagarjuna Yoga
- Nagarjunabhra Rasa
- Nagarjunabhra
- Nagarjunanjana

Significance and Scope of Rasashastra

Though the science Rasashastra is said to be evolved with primary aim of Lohavedha (conversion of lower metals to higher metals), gradually the later texts stressed mainly on the concept of dehavadha that prolongs life span and promotes positive health without being afflicted with diseases.

Rasaushadhis play an important role in preventing and treating the diseases. They are important formulations in Ayurvedic therapeutics as compared to formulations prepared from drugs of plant or animal origin due to various reasons. Because of lesser therapeutic dose, quicker action, prolonged shelf life, enhancement of action of other ingredients of formulation, efficient in geriatric patients and many such other causes, Rasoushadhis occupied the important place in the field of medicine.

Rasoushadhis are therapeutically administered in the dosage form of bhasmas, sindhooras etc., where the particle size is in the micro and nano size. Many researches have proved that these medicines are safe, effective, easily absorbable, assimiable, and colloidal as smaller the particle size better will be the absorption rate.

The significance of Rasoushadhis as told in various texts are as below:

'उत्तमो रसवैद्यस्तु मध्यमो मूलिकादिभिः। अधमः शस्त्रादाहाभ्यामित्थं वैद्यास्त्रिधा मता'।।

Among the three types of vaidyas, Rasavaidyas are considered as uttama (superior); those who treat with herbal drugs are madhyama (average); and those who treats with surgery, cautery and such others are considered as adhama (inferior).

साध्येषु भेषजं सर्वमीरितं तत्त्वेदिना। असाध्येष्वपि दातव्यो रसोऽतः श्रेष्ठ उच्यते ।। (R.S.S.1/5)

The experts can administer medicines and cure the sadhya rogas, but Rasa (Parada) and its yogas can be administered even in asadhya rogas. So rasoushadhis are considered to be the best medicines.

न रोगानां न दूष्यानां न च पुंसां परीक्षणम्। न देशस्य न कालस्य कार्यं रस चिकित्सते।।

(B. R. Jwaradhikara 5/479)

During the treatment using rasoushadhis, it is not mandatory to consider the dosha, dushya involved in the disease; gender, desha of the patient; and kala of treatment. So treating the emergency conditions will be easier.

अल्पमात्रोपयोगित्वादरुचेरप्रसंगतः। क्षिप्रमारोग्यदायित्वादौषधेभ्योऽधिको रसः ।। (R.S.S. ¼)

Rasoushadhis are considered to be superior among the medicines because of the following reasons:-

- Small therapeutic dosage
- Tasteless
- Bestowes quick results by curing diseases

स्वल्पा हि मात्रा विपुला गुणाढ्या सद्यो हि तद्दीपनबाहनं च।
यस्यास्ति तं चेन्न भजन्ति मर्त्यास्ते पूर्वजन्मार्जितपापभुजः। (R.Chu. 1/33)

- Rasoushadhis possess extensive qualities even in its smaller dosage.
- These medicines are appetizers (Deepaka) as well as carminatives (Pachaka) birth.
- They are also effective in curing diseases caused due to the sins of previous birth.

आसुरी मानुषी दैवी चिकित्सा त्रिविधा मता। शस्त्रैः कषायैर्लोहाद्यैः क्रमेणान्त्याः सुपूजिताः।
(B.R. Mishravarga Prakashana 3/23)

Three types of treatments are- Asuri, Manushi, and Daivi. Asuri treatment deals with surgical instruments; Manushi treatment includes treatment with herbal drugs and Daivi treatments is treating with Rasayogas. They are appreciable in successive order, the Daivi type of treatment is very significant among the three kinds of treatment.

The importance of Rasa Shastra defined in all Rasa Shastra texts as Rasa Shastra alone can make the body always youthful and eternal. Parada is the main element explained here along with other metals and minerals which possess an inherent capacity to rejuvenate and treat serious disorders.

Bhaishajya Kalpana

Definition and Etymology of Bhaishajya Kalpana

The term Bhaishajya kalpana comprises two words 'Bhaishajya' and 'Kalpana', where the word 'Bhaisajya' meaning a drug and kalpana means the ideology of making use of different dravyas after various processing. Bhaisajya is in turn derived from 'Bhisag' meaning a physician, a vaidya. Etymologically 'Bhaisajya' is a substance used by a 'Bhisag,' the physician as a means of treating a patient.

Bheshaja

तदेव युक्तं भेषज्यं, यदारोग्याय कल्पते ।। (C.S. Sutra 1/134)

Bheshaja is applicable to the dravya which helps to bring back the body to healthy status.

भैषज्यति चिकित्सति रोगान् विवर्तयति या अनेन इति भेषजं।।

Bheshaja is that which helps in treating the disease or helps in modifying the disease condition, to bring back the body to normal state.

Kalpana

कल्प्यते विधीयते असौ विधिः ।। (S.K.D)

शरीरोपरयोगार्थपेषणतोयाग्न्यादियोगेन। संस्करणमानेनइति कल्पना। (Chakrapani)

The word kalpana means method/process or transformation/conversion/modification

procedures/preparation of medicines by using either a single drug or a combination of several drugs by grinding, pouding, heating, frying, boiling etc carried out to make the drug fit for internal administration and to fulfil the patient's compliance.

भैषज्यानां कल्पनां इति भैषज्य कल्पना ।।

Bhaishajya kalpana is the branch of science which describes the preparation of various medicines.

Bhaishajya kalpana encompass the process or modification through which a substance is converted into that form, by which it would be therapeutically fit and feasible for use.

Chronological Development of Bhaishajya Kalpana

Prevedic Period

Usage of herbs as medicine is seen since the birth of mankind in this world. During prevedic period, men lived in forests in harmony with other animals and learnt many things from nature and animals. He observed the animals and birds eat the greenery around to get rid of their ailments. Initially he too consumed the plants in their natural form. By his experience, he grew cultured and intelligent, after which he tried to make those medicinal plants more palatable & made it easy for consumption. This led to the origin of usage of herbs for treating diseases. A Sumerian clay slab which is estimated to be 5000-year-old was found in Nagpur. This contains information about some herbal recipes and also references of Ahiphena and many such other plant species which are more than 250 in number. This provides the evidence about usage of herbs in different forms in Prevedic period.

Vedic Period

Mentioning of drugs and their various preparations are found in the vedas, which are the earliest written evidences.

- In Vedas, herbal drugs are divided into 2 groups:
  1. Bhaishajyani, drugs used for curing the diseases and
  2. Ayushyani, drugs used to attain longevity and health.
- The herb known as "Soma" has been mentioned frequently and is regarded as the best medication among natural remedies. According to Rigveda, the juice of soma has a sweet flavour and nectar-like properties that helps avoid death. It is also claimed that it can give the deaf the ability to hear, the blind the ability to see, and the lame the ability to walk.
- The preparation by name Asavi, Avishuta is mentioned and it is prepared by fermenting the Soma swarasa. The detailed description of the extraction of Soma

Rasa and its fermentation and the instruments, equipments and utensils to be used, with instructions of measurements and doses of each item and processes to be followed are given.

- In addition to Soma rasa, the term "Rasa" is used frequently and with different meanings in Vedic literature.
- Apart from swarasa, the terms 'Sura' and 'Madya' were also found mentioned frequently in Vedic literature, by which we can infer that during vedic period, people used the dosage forms like Swarasa, Kalka and sandhana kalpana like Sura and Madhya.
- Food preparations denoting culinary art are also found in Vedas. They are – Yoosha, Mamsa pachana, Amiksha, Saktu, Laja, Masara. People in the Vedic period were aware of Ahara kalpas.
- The mention of yajna kalpas like Haviss, Odana, and Dhana serves as evidence for this.

  धाना:करम्भ: सक्तव: परीवाप: पयोदधि। सोमस्य रूप हवषि आमिक्षावाजनिं मधु।। (Yaju.19/21)

  The Yajurveda contains reference of Dhana, Karambha, Saktu, Parivapa, Paya, Dadhi, Soma, Aamiksha, and Madhu, which suggest the contemporary knowledge of aushadha and Ahara kalpanas.
- In Atharva Veda, different types of sura, madya, mantha, dugdha, dadhi etc. are mentioned.
- References are also available about the Kalka made up of poison, mixing poison with water, preparing oil with poisonous herbs for usage in warfare.
- In Shatapatha Brahmana, there is a mentioning of Maitra Varuni payasya- Similar to paneer and Vajina- Supernatant liquid of the curd or dadhimastu.
- In Vedic period, we can discover numerous "Auşadha" and "Ahara" kalpas, demonstrating the awareness of the preparation of many kalpas.

Samhita Period

There was a remarkable growth in the field of Bhaishajya kalpana during the Samhita period, with the enormous contribution of each samhitas regarding this aspect.

Charaka Samhita

- This Samhita provides the systematic and scientific approach towards the Bhaishajya kalpana. Acharya Charaka is the first person to enlist the Pancha vidha kashaya kalpana and also explains Pancha kashaya yonis to point out the reason behind considering only five kashaya kalpanas.
- Phanita, Sidhu, Sura, Sauvira, Tushodaka, Maireya, Medaka, Dhanyāmla and other preparations are discussed in Charaka Samhita, Sutrasthana, 15th chapter.

- Preparation of pathya kalpanas such as Manda, Peya, Vilepi are described in this samhita.
- The extraction of taila and taila pāka, as well as tests and criteria for taila paka, are covered in detail in the seventh chapter of Vimana Sthana.
- Numerous Rasayana Kalpas and their various pharmaceutical forms including Churna, Avaleha, Aushadha Siddha Ghrita, Ksheera, Kshaudra, Guda, Yoosha, Taila etc. are listed in the first chapter of Charaka Samhita Chikitsa sthana. In this sthana, there is also description about Kshara kalpana and Vataka kalpana.
- Explanation of various Ahara kalpanas like Krshara, Odana, Laja, Takra, Poopa, Poopalika, Shashkuli and others are availablie in this text.
- In Kalpa sthana, a number of preparations, including Kashaya, Kshirapaka, Taila, Ghrita, Phanita, Churna, Varti, Leha and Modaka, which are helpful in panchakarma are explained.
- Some pharmaceutics principles are stated in the 12th chapter of Kalpa Sthana, along with Mana paribhasa (weights and measures).

Sushruta Samhita

- Acharya Sushruta mentioned six kashaya kalpanas- Ksheera, Swarasa, Kalka, Shrta, Sheeta and Phanta. These are considered to be laghu in ascending order. Ksheera paka, the preparation which is most Guru is included as an additional form of kalpana to the list of kashaya kalpana.
- A big contribution of Acharya Sushruta to Bhaishajya Kalpana is the detailed description of Kshara kalpana as part of Shalyatantra procedure.
- The preparations mentioned in Sushruta samhita are almost similar to that of Charaka samhita, but Acharya Sushruta had given more importance for the preparations useful in Vranas, Jatrurdhwa rogas and Kshara preparations.
- Acharya Sushruta had explained various aushadha kalpanas like Avaleha, Taila, Ghrta, Ayaskriti, Alepa, Utkarika, Ksharasutra, Madhya etc., and also different Ahara kalpanas like Manda, Peya, Vilepi, Yavagu, Yusha, Odana, Kurchika, Khanda, Pruthuka, Rasala, Veshavara, Raga-shadava etc.,

Ashtanga Sangraha and Ashtanga Hridaya

The descriptions of pharmaceutical preparations in these books are similar to those in the Charaka Samhita and Sushruta Samhita.

Bhaishajya Ratnavali

- For the frst time, the concept of "Murchana Samskara," of Taila and Ghrta is mentioned in the jwara chikitsa of this text. The Murchana process of Tila taila, Eranda taila, Sarshapa taila and Ghrita are explained.

- Sri Govindadasa, the author of this text added many new herbal and herbo-mineral formulations, among them many of them are Anubhuta yogas.

Sharangadhara Samhita

- This text can be considered as the referral guide for the Bhaishajya kalpana as there is a systematic and detailed explanation about all the preparations and concepts of Bhaishajya kalpana.
- In Prathama khanda, Aushadha sevana kala, shelf life, weights and measurements are explained.
- In Madhyama khanda, there is elaborate explanation of all kalpans and upakalpanas, which includes method of prepartions with the propotion of individual components, Paka siddhi lakshanas, Prakshepa dravyas, Matra, Anupana, and many examples of the preparations with indications.
- This text is the first to mention pharmaceutical preparations, their general principles etc. in a methodical and comprehensive way all in one place.

Post Samhita Period

- Some of the new dosage forms were introduced after Sharangadhara like Sharabat, Panaka, Malahara, and Arka.
- Yogaratnakara mentioned several food preparations like Polika, Vataka, Kanji, Panaka, Ragakhandava, Veshavara etc. He also mentioned Abhava pratinidhi dravya in his text.
- Ayurveda Sara Sangraha book explains Arka kalpana, Sharbat kalpana, Khanda kalpana, Kshara, Lavana, Satva, Shweta Malaham, Gulabi Malaham, Netra rogahara malaham etc.
- Compilation of thousands of Ayurvedic medicines of both Rasashastra and Bhaishajya Kalpana in an alphabetic order were done in compiled texts like Bharatha Bhaishajya Ratnakara and Brihat Nighantu Ratnakara.

Modern Period

- With the advent of modern technology, Ayurveda pharmaceutical companies have started using new instruments for the preparations like pulverisers, tablet compression machines, grinders, juice extractors, mixers, driers, etc.
- Many new dosage forms such as lozenges, capsules, syrups, dispersible tablets, sugar coated tablets, entric coated tablets, liniments etc. are added to Bhaishajya Kalpana with the advent of preservatives and additives to increase their shelf life.
- Modern packaging and labelling techniques have extended the quality and shelf life of Ayurvedic medicines.

- The Drugs and Cosmetics Act, 1940 and The Drugs and Cosmetics Rules, 1945 have mentioned standard rules and regulations for the manufacturing of Ayurveda medicines. Implementation of these rules is made mandatory to all Ayurveda pharmaceutical companies.
- Modern standardization techniques have incorporated into the Ayurvedic pharmaceutics to standardize raw drugs, pharmaceutical procedures and finished products.

Thus, the core principles and fundamentals of Ayurveda pharmaceutical formulations and ideas described in our classics are still in practice today. Ayurveda pharmaceutics has just been implemented with modern techniques, equipments and standardization procedures to cope with the present demands of ever increasing urbanization and world wide acceptance.

Significance and Scope of Bhaishajya Kalpana

- CharakaAcharya (Caraka Samhita- Sutra Sthana 1/126,) says even a poison is an effective drug if used judiciously, whereas injudicious use of even an elixir can prove harmful. So using a drug in a judicious way with suitable processing is prime importance, which can be achieved with the aid of principles of Bhaishajya kalpana.
- Bhaishajya kalpana deals with the different processing techniques which will make the drug more potent.

अल्पस्यापि महार्थत्वं प्रभूतस्याल्प कर्मतां। कुर्यात् सम्योग विश्लेष काल संस्कारं युक्तिभिः।।

(Cha.S.Kal. 12/48)

Even a simple drug could be made into most effective drug by simple processing like Samyoga (combination), Vishlesha (Separation), Kala (processing related to time), Samskara (modification procedures) and Yukti (intellectual perception and application after proper analysis).

- This science explains about various procedures which makes the drug more palatable, pleasing, easy for administration and in turn increases the patient's acceptance.
- The different procedures told in this science helps in the extraction of maximum active principles of the drug and also increases the bio availability of the drug.
- Varieties of formulations explained in this science increases the shelf life of the preparations, so that they can be preserved for longer period and can also be used in the time and place of non availability of drug.

Important Books of Rasashastra and Bhaishajya kalpana and their Authors

12th century CE

Rasendra Mangala	Siddha Nagarjuna
Rasahridaya Tantra	Acharya Bhagavatpada Govinda

12th century CE

Goraksha Samhita	Acharya Gorakhanatha
Rasarnava	Sri Bhairvananda Yogi
Rasendra Chudamani	Acharya Somadeva

13th century CE

Rasaprakasha Sudhakara	Acharya Yashodhara Bhatta
Rasa Ratnakara	Acharya Nityanatha
Rasa Paddhati	Acharya Bindu
Ananda Kanda	Shri Manthana Bhairava

14th century CE

Sharangadhara Samhita	Acharya Sharangadhara
Rasaratna Samuchchaya	VagbhatAcharya
Rasendra Chintamani	Acharya Dhundhukanatha
Rasa Chintamani	Acharya Madanathadeva Suri

15th century CE

Rasa Kaumudhi	Acharya Gnanachandra
Rasamanjari	Siddha Shalinatha
Rasanakshatra Malika	Rajavaidya Mathana Simha
Rasaratna Pradeepa	Acharya Ramaraja
Loha Sarvasvam	Acharya Sureshwara
Rasasara	GovindAcharya

16th century CE

Bhava Prakasha	Acharya Bhavamishra
Basavarajeeyam	Acharya Basavaraj
Rasendra Sara Sangraha	Acharya Gopal Krishna Bhatta
Rasa Koumudi	Acharya Chandrashekhara Munishwara
Arka Prakasha	Acharya Ravana

17th century CE

Rasa Kamadhenu	Acharya Chudamani Mishra

Yoga Tarangini	Acharya Trimalla Bhatta
Ayurveda Prakasha	Acharya Madhava
Rasa Pradeepa	Vaidya Prananatha

18th century CE

Bhaishajya Ratnavali	Acharya Govinda Sena
Yoga Ratnakara	-
Rasayana Sangraha	Shri Krishna Shastri Yadav

19th century CE

Rasa Ratna Manimala	Baba Bai
Brihadrasaraja Sundara	Acharya Dattarama Choubey
Rasa Sangraha Siddanta	Acharya Govinda

20th century CE

Rasa Tarangini	Acharya Sadananda Sharma
Rasa Jala Nidhi	Bhudev Mukharji
History of Hindu Chemistry	P. C. Roy
Rasendra Purana	Acharya Ramaprasada Sharma
Rasayoga Sagara	Vaidya Hariprapanna Sharma
Bhasma Vijnana	Acharya Harisarananda
Rasamrita	Acharya Yadavaji
Rasendra Sampradaya	Acharya Hajarilala Sukhla
Rasachikitsa Acharya	Prabhakara Chattopadhyaya
Parada Vijnaniya	Acharya Vasudeva Mulasankara Dwivedi
Parada Samhita	Vaidya Niranjan Prasad

Brief Description of Some Rasa and Bhaishajya Text

Rasendra Mangala

Author : Siddha Nagarjuna

Time period : 8th century CE

Chapters : 8 Chapters; but only first 4 Chapters are available

Highlights

- The text was published in 1924. But this published text contains 1-4 chapters, though the original work contains 8 chapters.
- Rasendra Mangala describes only 8 Parada samskaras, but mentioned about 18 samskaras.

- Parpati kalpana is referred as Parpati rasa and indicated in Kushta disease. The author also explains few formulations indicated in diseases like Kamala, Gulma etc.,
- Some of the contibutions of this text are: explanation of Dhatu, Ratna, Loha marana, concept of Dhruti etc.

Rasa Hridaya Tantra

Author	:	Acharya Govida bhagvat pada, the preceptor of SankarAcharya, son of Sri Sumano Vishnu. Acharya Govinda Bhagavatpada was Rajavaidya of Sri Madan, king of Kirata.
Time period	:	10th century CE
Chapters	:	19 chapters called as Avabhoda

Highlights

- This book provides elaborative and very systematic description of 18 samskaras of Parada both for Lohasiddhi (metallic transformation i.e. formation of noble metal from the base metal) and Dehasiddhi (metabolic transformation i.e. make the body strong and healthy).
- The philosophical thoughts are vividly discussed and these views are presented as a Raseswara darshana.
- The author has explained the importance of metals and minerals in metabolic transformation i.e., in Dehavada.
- Detailed description of druti is found in this book.
- In this text very peculiar process like Dwandwana, Dwandwa-melapana are described in the context of Jarana.
- Description of different beeja and their applications are also found in the text.
- Description of some therapeutic indications only at the end of the book justifies that this text is alchemy dominated.

Rasarnava

Author	:	Sri Bhairavananda yogi of Kapalika tradition
Time period	:	12th century CE
Chapters	:	18 chapters called as Patalas

Highlights

- This treatise is in a dialogue form between Lord Shiva and Godess Parvati.
- It deals in detail about Parada, Parada samskara, Parada bandha, Dhatuvedha (alchemy transmutation of metals) and Dehavedha (making the body free of disease and strong), more about Dhatuvedha.

- Jwala pareeksha has been explained in this text which helps in identifying the metals by observing its colour when burnt on fire.
- Various methods for coloring for Dhatu Ranjana, for Lohavedha converting lower metals into gold, silver are mentioned.
- Treatment aspect is less often covered in this treatise.

Rasendra Chudamani

Author : Acharya Somadeva

Time period : 12th century CE

Chapters : 16 chapters

Highlights

- Various authors like Rasavagbhata, Yashodhara bhatta and others followed this book and quoted as such in their texts.
- This text contains the details of Paribhasha, Parada puja, Rasashala, Yantra, Musha, Puta, 18 samskaras of Parada, Parada bandha and classification of Rasa dravyas.
- This is the first authoritative text of Rasashastra where there is a mention of new dravya varga i.e., Sadharana rasa comprising of 8 drugs. Except Hingula, Girisindura and Kaparda, other minerals and marine products seem to be new addition.

Rasa Prakasha Sudhakara

Author : Acharya Yashodhara Bhatta son of Shri Padmanabha Bhatta who belonged to Gouda Brahmana Kula and resident of Junagad, a place in Saurashtra, Gujarat.

Time period : 13th century CE

Chapters : 13 chapters

Highlights

- Rasa-Prakasha-Sudhakara is an important treatise, which describes Lohavada and Chikitsavada in detail.
- Method of preparation of Rasa Bhasma on the basis of colour is explained in detail along with its uses.
- The method of preparation of Rasa karpura was first described in this book. The author mentioned this as Parada shweta bhasma.
- The text explains 100 Rasa Yogas which are useful in curing most of the diseases, which includes popular medicines like Jwarankusha Rasa, Jwarari Rasa etc. Mentions various Yogas for Vajikarana and Veerya Stambana.

- It explains amazing acts of colouring the Dhatus like Hemakarana, Roupyakarana etc.

Rasa Ratnakara

Author	:	Siddha Nithyanatha, Son of Srimathi Parvathi
Time period	:	13th century CE
Chapters	:	20 chapters called as Upadesha; commentator added four Parishishta (appendix).

It contains 5 khandas :-

1. Rasa khanda deals about Vaidhya,
2. Rasendra khanda deals about Vyadhi,
3. Vadhi or Riddhi khanda deals about Dhathu vada or Loha vada,
4. Rasayana khanda deals about vruddha,
5. Mantra khanda deals about Mantra and Rasa siddhas.

Highlights

- The book "Rasa Ratnakara" mainly deals with loha vada. This book doesn't give much importance to therapeutic utility of Rasa dravyas.
- The Uparasas and Maharasas mentioned in this book are different from Rasaratna samuchchaya. In Uparasa, Kankshi and Anjana are replaced by Rajavarta and Bhookhaga. In Maharasa, Abhraka and Vaikranta are replaced by Hingula and Anjana.
- Specific methods of Parada shodhana, Samanya shodhana of Uparasas and shat guna jarana of Gandhaka are mentioned. Bhunaga taila has been explained in the context of Naga ranjana. While explaining astadasha samskaras of Parada, "Anuvasana" has been mentioned.
- Artificial method of preparing Ratna, Lavana has been mentioned along with description regarding dhanya vrudhi karana.
- Extensive explanation of Lohavada i.e conversion of lower metal to higher metal can be observed in this book. In most of the instances, Tamra and Naga are converted into higher metal.
- Shodhana and bhasmikarana of Dhatus, preparation of Siddha churna which was used for Tamravedha, explanation of equipments like Lipta musha, Chakra yantra etc had mentioned in this treatise.

Ananda Kanda

Author	:	Shri Manthana Bhairava
Time period	:	13th century CE

Chapters : 36 chapters called as Ullasas in two parts titled as Visranti.

The first Visranti (Amritikarana Visranti) comprises of 26 Ullasas. The second Visranti (kriyakarana visranti) comprising 10 Ullasas.

Highlights

- The book is written as the conversation between Lord Shiva and Godess Parvati and the subject matter of this text is arranged systematically.
- The work contains details of Mercury, about 39 methods of incineration of Mercury are explained with typical description of Rasalinga, the oval shaped solid form of Lord Shiva made of Mercury.
- Dehavada concept of Rasa Shastra has been described elaborately along with Lohavada. Shadanga yoga, DinAcharya, Rutucharya, Sadachara Rasayana etc. also been described in this text.

Rasa Ratna Samuchaya

Author : Simhagupta putra Rasavagbhata.

Time period : 13-14th century CE

Chapters : 30 Adhyayas (Purvakhanda- first 11 Adhyayas; Uttarkhanda- next 19 Adhyayas)

Highlights

- Rasa Ratna Samuchchaya (literally means a book containing all the gems of Rasa Shastra) and is considered as an authentic work for study & practice of Rasashastra.
- The text is written in puranik tantric style and it is a compiled work from Rasa Prakasha Sudhakara, Rasarnava, as declared by author himself in first chapter.
- He has added a great knowledge to the field of Rasashastra. Yogas mentioned in this text are very effective.
- It is sangraha grantha and author might also contributed some topics but it is difficult to specify his own work.
- The book includes systematic classification of rasa dravya based on their use in rasa karma and extensive explanation of Paribhasha.
- Among 30 chapters, first 11 chapters furnish the details of Rasa and Rasadravyas while remaining deal with diagnosis & treatment.

Rasendra Chintamani

Author : Acharya Shri Dundukanatha who was a shishya of Acharya Kalanatha

Time period : 14th century CE

Chapters : 9 Chapters and named as Adhyaya.

Highlights

- Rasendra Chintamani is a text which contains both the Lohavada and Dehavada aspects. Though it is written during the time of Chikitsavada, highlights more on concept of Dhatuvada and less in relation to Chikitsavada.
- Acharya Dundukanath says in the text that the contents which are described are only those which are practically witnessed and performed by him in the presence of his guru.
- Formulations mentioned in the text are those which are prepared by the author himself and utilized among patients successfully.
- 1st to 7th chapters discuss exclusively on basic concepts and dravyas used in Rasashastra. While 8th and 9th chapters throw a light on herbal, herbo-mineral formulations which are having practical applicability.

Rasa Chintamani

Author : Acharya Anantdeva Suri

Time period : 14th century CE

Chapters : 11 Chapters termed as Sthavaka

Highlights

- This book contains both the concept of Dhatuvada and Dehavada
- Procedures of Parada samskara, Dhatu bhasma nirmana vidhi and various procedures to convert lower metals to Suvarna and Rajata are dealt with.
- Some unique preparations like Rasa gutika, Khechari gutika has been explained.

Sharangadhara Samhita

Author : Acharya Sharangadhara, son of Damodara.
Sanskrit Commentators and Commentary: Adhamallaa- Deepika; Bopadeva- Gudartha deepika; Rudra bhatta- Ayurveda deepika.

Time period : 14th century CE

Chapters : 32 Chapters in 3 Khandas-Poorva- 7 chapters; Madhyama- 12 chapters; Uttara- 13 chapters.

Highlights

- This is one among Laghu trayee and recognized as an authentic work on Ayurvedic pharmaceuticals.

- A separate chapter is allotted for methods of Shodhana, Marana and processing of Mercurial preparations.
- Though the text predominantly deals with Bhaishajya kalpana, brief narration of Basic principles, Anatomy, Physiology, methods of diagnosis and enumeration of diseases is also seen.
- Devoted one complete section- 12 chapters (madhyama khanda) for aushadha nirmana. Clear definitions of pharmacological terms are found only in this text, and also all types of methods of preparation has been explained.
- Few important contributions are Nadi Pareeksha; concept of Snayuka Krimi; details of Shukra Stambhaka dravyas; addition of new drugs like Ahiphena, Jayapala, Bhang; explanation of Physiology of Respiration by using new terms like Ambara-Peeyusha, Vishnupadamrita and Jeevaraktashaya; description of Fetal circulation; Upadhatus are first explained in this text; Soochikabharana Rasa Prayoga (a new techniques of introducing drugs directly into the blood stream through an artificial wound), Mana Paribhasha in detail.
- Vajeekarana, Vasheekarana, Bhagasankocha, Lingavruddhikara, Lomashatana, Keshavardhana, Palitanashana, Mukhavyanganashaka etc yogas are mentioned.
- The preparations found here are simple, easy to prepare and efficacious hence this treatise is a good practitioner hand book. Mineral drugs are widely used in almost all dosage forms like Taila, Asava, Vati, Lepa etc.

Arka Prakasha

Author : Lankadhipati Ravana, son of Vishwashrava.

Time period : 16th century CE

Chapters : 10 chapters called as Shataka

Highlights

- Arka prakasha is a classical treatise which focuses on Arka Kalpana i.e distillate preparations.
- In this book, Arkas (distillates) prepared out of herbal and mineral drugs indicated in different rogas have been mentioned and Arka of all drugs has been mentioned based on rasa panchaka, guna, vyadhi nashakata criteria.
- Some of them act as oushadhi (medicine), some as anupana (vehicle). The method of shodhana, marana of rasa dravyas and dhathus with the help of Arka has been described.
- The author has given the Rutu kramena Arka sevana vidhi. With the help of Arka, Vashikarana, Vidweshikarana vidhi, Uchatana vidhi, Buddhi stambhana vidhi has been explained.

- Apart from Arka, the author has mentioned different preparations such as panchavidha Kashaya Kalpana like Kalka, Churna, Rasa and Taila etc.
- Different vargas of Vamana, Virechana, Krimighna, Vataghna, Phala, Dhatu, Upadhatu, Ratna And Uparatna, etc. has been mentioned.
- Shodhana, Marana of different Rasoushadies are explained. Indication of Loha and Haratala bhasma with different anupanas is mentioned as well.

Basvarajeeyam

Author : Srikantha Kotturu Basavaraju, Resident of Karnataka/ Andhra Pradesh, Son of Namah Shivaya and Shishya of Aradhaya Ramadeshika from Andra pradesh

Time period : Early 16th century CE

Chapters : 25 Chapters termed as Prakaranas.

Highlights

- Basavarajeeyam has presented subject in a different style and it is a practical oriented book.
- It is written in Telagu language and was translated into Sanskrit by Sri Govardhan sharma changani with the help of Sri Nallagundlavara Hanumant shastri.
- Some of the popular yogas of Telugu region also have been explained and are presently in vogue in Andhra region.
- Author has highlighted more popular yogas which are explained in various classical Ayurveda granthas.
- In first 24 Prakarana, the author explained in detail regarding Nadi pareeksha, detail explanation of Vyadhis like Jwara etc., their Nidana, Samprapthi, Sadhyasadhyatha, Pathyapathya, Treatment etc.
- In the 25th Prakarana, he explained about the various aspect of Rasa shastra.
- It is the first book that explains about karmavada w.r.t. drug and disease.
- Not explained about Yantra, Musha, Puta etc., about Visha Upavisha, about Grahya and Agrahya lakshanas of Rasa dravyas.

Rasendra Saara Sangraha

Author : Sri Gopal Krishna bhatt from orissa.

Time period : 16th century CE

Chapters : 5 chapters

Highlights

- It is an exemplary work of compilation of various material related to Rasa and

other minerals. It deals with minerals and metals as well as therapeutics based on the diseases. It contains many effective formulations.

- Overall 600-650 Rasayogas have been compiled, among them a few pure herbal formulations have also gained place.
- Commercial scale manufacturing of certain preparations like Rasa Manikya etc. are also the contributions of this book.
- Explained about Rasachikitsa in diseases and it is more popular in rural practitioners (as explained by the vyakhyakar).
- The treatise is like a ready reckoner for a Rasa shala (Pharmacy).

Ayurveda Prakasha

Author : Shrimadh Upadhyaya Madhava, Born in Sarasvata Brahmana Kula in Saurastra desha.

Time period : 17th century CE

Chapters : 6 chapters, called as Adhyaya

Highlights

- It is a compiled book with many important creations and modifications of its own, based on the practical experiences of the author. The matter told here is Anubhavapurna, Kritisadhya, Sahaja and Sulabha.
- The book covers all concepts told in Rasashastra. 1st chapter- Parada as Rasa & Maharasa; 2nd chapter- Uparasa; 3rd chapter- Dhatu; 4th chapter- Upadhatu; 5th chapter- Ratnoparatnas; 6th chapter- Vishopavishas.
- The pattern of classification of Mineral drugs (Rasavarga dravya) is found in unique nature. At the beginning of each chapter the reason for its order is mentioned.
- Detailed description of 20 Uparasa, 6 Sadharana Rasa, 9 Dhatu, 7 Upadhatu, 9 Ratna, 17 Uparatna, Mishraka Gana, Yantra, Puta, Bhasma Pariksha are given.
- Taila patana vidhi of Visha with similar process as that of Satvapatana with kaancha yantra is contribution of the text which is said as useful in making Parada kshutkari and Mahaan.
- Parada Jarana and Samskara are explained in detail with practically applicable, easy and optional methods.
- Many references of Druti, Satva of individual drugs and their processing are mentioned.

Rasa Kamadhenu

Author : Shree Chudamani Mishra son of Hari Ram Mishra, belongs to Shaaka dweepeeya Bhrahmana's family, presently it is in Uttar Pradesh, Bihar.

Time period : 17th century CE

Chapters : 81 Chapters in 4 Paadas - Upakarana paada, Dhatu sanghraha paada, Rasa karma paada and Chikitsa paada

Highlights

- This is one of the compiled book, which concentrates on both Loha vada and Deha vada. Many anubhuta yogas are also mentioned.
- The author concentrated more on chikitsa pada, which is the fundamental aspect for the bhishak to treat the diseases.
- Detailed description regarding different types of yantras and ashta samskara of Parada are seen.
- Botanical description as well as method of usage of different Divyoushadhis which aid in deha sidhi as well as loha sidhi is available in this text.
- Descriptions regarding udakas like Chandrodaka, Ushnodaka, Sailodaka And Vishodaka which help to make Parada stable.
- Some special diseases and their chikitsa are mentioned like Daha, Agnimandya, Shleepada, Andavriddhi, Gandamala, Kodrava, Klaibya, Vrana and Snayu Roga.

Yoga Ratnakara

Author : Unknown but some scholars opines as a jain priest Narayana shekhara or Nayana shekhara or Mayurapada Bhikshu

Time period : 18th century CE

Chapters : 72 chapters in 2 parts- Purvardha and Uttarardha

Highlights

- Yogaratnakara describes Ayurveda in its entirety in a very organized and different way. The text deals in detail the basic concepts of Ayurveda, herbal, herbomineral and metallic preparations along with their identification and properties of individual plant and metals and also method of shodhana and marana of metals etc., then method of preparation of recipes as well-as the dosages and after medications.
- It describes in detail Ashtavidha pareeksha i.e. the eight measures of diagnosis as Nadi pareeksha, Mutra pareeksha, Mala pareeksha, Shabda pareeksha, Drik pareeksha, Rupa pareeksha, Asya pareeksha including Jihva pareeksha.
- Few contributions are Taila bindu pareeksha as a diagnostic tool; mentioned colour of stool and urine according to the disease; description of diseases like Somaroga (Gynaec disease), Snayuka, Sitala
- Descriptions are seen related to weights and measures along with their synonyms according to magadha and kalinga schools; Kashaya kalpana; qualities and methods

of shodhana and marana of all the metals, colour of different processed bhasma, substitute, gems and also some herbs, abhava varga i.e. substitute substances;

- The last four chapters classified as uttarakhanda deal with Vajikarana, Rasayana, Rasavaikrti (complications due to improper use of Mercury) and Roganusara anupana.

Bhaishajya Ratnavali

Author : Kaviraj Govinda Das Sen, son of Chandrachud Sen and Ambika

Time period : 18th Century CE

Chapters : 106 chapters

Highlights

- Bhaishajya Ratnavali is one of the most popular and authentic compendia of Ayurveda. It is an complete text which includes all the branches of Ayurveda. The author not only complied from the avail texts but also introduces some new diseases and formulations.
- It is one of the practical oriented book as it contains explanation for each diseases with chikitsa sutra krama along with Pathya & Apathya Ahara vihara which has been dealt in detail at the end of that chikitsa prakarana.
- Yogas includes Swarasa, Kalka, Lepa, Churna, Gutika, Avaleha, Modaka, Panaka, Asava, Arista, Ghrita, Taila, and Rasa Rasayana. Also compound preparation including Herbal and Herbo mineral preparations are mentioned in detail for each disease.
- Though it is a compiled text, author has made his own contributions. Chapters are explained according to disease and Based on kriyakala, the usage of drugs are explained. The Author has covered some rare diseases in Vishishta chapters.
- Utpatti, Bhedha, Guna, Shodhana, Marana of Maharasa, Uparasa, Sadharana rasa, Ratna, Uparatna, Visha, Upavisha are explained.
- Special contributions are: Taila, Gritha Murchhana has been explained with ingredients; Shodhana of Dravyas; Gandhapaka (sugandha dravyas) added in sneha kalpana; Preparation of parpati has been explained in grahani rogadhikara; Eka moolika prayoga.

Siddha Bheshaja Manimala

Author : Sri Krishna Ram Bhatt

Time period : 20th century CE

Chapters : 5 chapters termed as 'Guchcha' which means Bunch.

Highlights

- The matter of siddha prayogas (application of medicines) in this book has resemblance and arranged like Mani (precious stones) in Mala (garland) and so named as Sidhabheshaja manimala.
- Taila Bindu Pariksha (oil drop test) is mentioned for knowing sadhya asadhyatwa (prognosis of disease).
- The book Siddha Bheshaja Manimanla has given contribution to both herbal & mineral preparations. Separate chapters are given for each disease with their own chikitsa prayogas.
- Parada prakarana is explained separately; different methods of extraction of Parada, Samskaras adopted for Parada karma, 83 rasayogas and chaturvidha Rasayanas like Kupipakwa, Pottali, Parpati& Kharaliya Rasayanas are also explained.
- Most of Siddha yogas are mentioned by the authors own experience. Some of the easy preparation of medicines and home remedies have been explained.

Rasamritam

Author	:	Vd. Yadavji Trikamji Acharya
Time period	:	20th century CE
Chapters	:	09 chapters and 09 indices

Highlights

1 The text Rasamritam is a practical hand book of therapeutic usage of different Rasa dravyas and their processing techniques. It is a literature of modern era where one can appreciate the amalgamation of modern chemistry and Rasa Shastra.

- In Rasamritam, the classification of the drugs along with their descriptions, are presented in a very systematic way, instead of following the traditional method like Maharasa, Uparasa, Sadharana Rasa, etc. All the Dhatus (metals) like Swarna, Rajata, etc. are described along with Khanija (minerals) of the corresponding Dhatu like Makshika for Tamra, Abhraka for Loha etc. and Mishra Dhatus like Pittala, Kansya, etc. in a same chapter under the name Loha Vigyaniya.
- Drugs like Malla, Sudha, Sikata, Lavana, Kshara, Ratna are discussed in individual chapters.
- The last chapter describes some compound formulations having high therapeutic value.
- Incorporation of some Unani drugs are also found in this text.
- The book mainly concentrates on Dehavada and description of Dhatuvada aspects is not much found in this text.

- At the end, there is a description of 09 indices, which are most valuable part of this book and describes the practical utility of manufacturing processes of Rasa dravyas.

Bharatha Bhaishajya Ratnakara

Author : Shree Nagindas Chaganlal Shah of Jain community, whose native place was unjha, situated at Gujarat.

Time period : 20th century CE

Chapters : 5 volumes

Highlights

- Bharat Bhaishajya Ratnakar is an authoritative text that compiles of total 9598 formulation from different Ayurvedic text such as- Ayurveda Prakasha, Ayurveda Sangraha, Charaka Samhita etc., The author has compiled the references of all the texts and arranged them in the chronological order of Hindi alphabets.
- Kalpas are mentioned in the order of Kashayakalpana > Churnakalpana > Vati > Guggulu > Avaleha > Ghrita > Taila > Asavaarishta > Lepa > Dhoop > Dhumra > Anjana > Nasya > Rasakalpana all in their chronological order.
- Only in the अ karadi prakarana, the author has mentioned the method of preparation in the starting of every formulations. Then the kalpas of that preparation starting with the alphabet अ has mentioned. After that he has mentioned the kalpas of other prakaranas.
- In the end, under Parishishta some of the important definitions are given and the separate notes on the Mana Paribhasha has been mentioned.

Rasa Jala Nidhi

Author : Pandit Bhudeb Mukherji, a Bengali scholar

Time period : 20th century CE

Chapters : 40 Chapters in 5 Volumes

Highlights

- Rasa jalanidhi is a compiled practical and clinical oriented book. It mainly deals with Lohavada and Dehavada giving more emphasis to Dehavada.
- All Rasadravyas are termed as Uparasas and are classified into 3 groups.
- Shloka numbering trend is not seen in this book.
- Unique Contributions of the Text are: 3 Types of paradagatis; Parpatis like Mahesha-parpati, Brahma parpati, Nakuli parpati rasa, Unmatta parpati rasa has been mentioned and explained in detail; 8 types of Mandura yogas like Koladi

manduram, Guda mandura etc., has been explained; The artificial preparation o Sarji Kshara has been explained; Sixth lavana as Navasara/Chullika lavana; Tail patana using any kind of seed has been explained; The unique yantras includ Khalachari yantra, Chakra yantra, Gowri yantra, and Baka yantra.

Rasa Tarangini

Author	:	Acharya Sadananda Sharma, son of Pandit Jeevananda and Saraswati Devi
Time period	:	20th century CE
Chapters	:	24 chapters termed as 'Taranga'

Highlights

- The text Rasatarangini has provided a scientific and practical approach to th procedures of Rasashastra. It contains only those procedures which are realisti and feasible in present scenario.
- The author has not mentioned the Lohavada (metal transformation of lower metal to gold) aspects, 18 Samskaras, Divyaushadhis, Parada Bandhas.
- He has not classified the drugs as routinely under Maharasa, Uparasa etc Classification of Rasa Dravyas are made based on modern chemistry and scientific background like he had placed all arsenicals in one chapter, Mandura has been placed in Lauha chapter to indicate presence of iron in it.
- He enumerates many synonyms of Rasa Dravyas. He had enlisted lot of therapeutic indication of Rasa Dravyas with different suitable Sahapana and Anupana.
- Drugs of herbal origin like Kampillaka and Kankustha have been excluded. Similarly Agnijara has been omitted due to its non therapeutic use in present era.
- Few contributions of this Text are: Explanation with diagrams of Puta and Musha; Explaination of Mrudanga yantra, Sikta taila praparation; description of Suryakshara; mentioned artificial preparation of several Rasa Dravyas like Hingula, Manahshila, Haratala etc.; quoted Sanskrit terms for few chemicals of modern chemistry and discussed their preparation and usage in detail. Few of them are Gandhakamliya Yashada, Sorakamliya Rajata, Soraka Drava, Lavana Drava etc.

Rasa Yoga Sagara

Author	:	Vaidya Pandit Hariprapanna Sharma
Time period	:	20th century CE
Chapters	:	2 Volumes

Highlights

- Rasa yoga sagara is a compiled book of around 4500 main Herbo-mineral preparations arranged in an alphabetical order.
- Compiled all formulations of same name in different text and it is easy to search formulations of various references.
- The author also explained some versus which has not been explained previously like Avira kalpa.

Parada Samhita

Author : Vaidya Niranjan prasad
Time period : 20th century CE
Chapters : 60 chapters

Highlights

- Parada samhita is one of the compiled book which contains detail description of Rasashastra.
- It includes detail explanation of astha samskara, asthadasha samskara and vimshati samskara, Rasa sevana samskara and oushadhi pariksha.
- The author also explained 43 types of Yantra, 16 types of Musha, 13 types of Putas and procedure to prepare different types of Puta, Koshti, Musha, Khalwa etc.

Concept of Rasashala and Bheshajagara

Rasashala or Bheshajagara is a place where the medicines are manufactured. In most of the Rasashastra texts, there is a description of Rasashala and our Acharyas have explained each and every aspect of the Rasashala. There is a detail description of the production area, its location, interior arrangements along with well thought of directions of various sections and also the qualities of staff required for pharmacy.

Location of Rasashala

आतङ्करहिते देशे धर्मराज्ये मनोरमे । उमामहेश्वरोपेते समृद्धे नगरे शुभे।। (R.R.S.6/11)

- The Rasa shala should be built in a place which is devoid of any kind of fears and anxiety.
- It should be situated in the Dharmarajya (kingdom where ruling is done with virtue and honesty).
- It should be in the place where Lord Shiva and Parvati abode and which is a flourishing place.

रसशालां प्रकुर्वीत सर्वबाधाविवर्जिते। सर्वौषधिमये देशे रम्ये कूपसमन्विते।।
यक्षन्यक्षं सहस्राक्षं दिग्विभागे सुशोभने। भानोपकरणोपेतां प्रकारेण सुशोभिताम्।। (R.R.S.7/1-2)

- The location of Rasa shala should be free from disturbances or obstructions.
- The area should have all medicinal herbs available nearby or where they can be cultivated.
- It should be constructed in a beautiful place which is endowed with sources of water like wells, rivers etc.,
- Pharmacy should be built in a very auspicious northern, northeastern (Eashanya) or eastern direction of the place.
- Its building should be well protected with high boundary walls and it should be well equipped with all necessary instruments.

According to Rasa tarangani (R.T.1/13-14), Rasashala should be constructed in Vimala, Ramaneeya, Upavana pradesa (clean, healthy and beautiful place which is natural, fertile, free from pollution,), Jalayantra shobhita (endowed with sources of water), Gavaksha samyuta (well ventilated), Janabadharahita (away from city population), Asankulam (not congested), Akhila aushadha varga samyukta (having various and plenty medicines. A separate storage section for Siddaoushada), Raseshwara chitra bhooshita (decorated with portraiats and pictures of Raseshwara), Vipula akhila sadhanavitta (equipped with all necessary instruments).

These descriptions are very precise instructions given in classics, which resembles the present guidelines of GMP.

Working Area of Rasashala

कर्तव्यं साधनं तत्र रसराजस्य धीमता। अत्यन्तोपवने रम्ये चतुर्द्वारोपशोभिते।।
तत्र शाला प्रकर्तव्या सुविस्तीर्णा मनोरमा। सम्यग्वातायनापेता दिव्यचित्रैर्विचित्रिता। (R.R.S.6/12-13)

Rasashala is constructed in the midst of a beautiful park with four entrances. Inside the pharmacy, there should be sufficient space and should have pleasing and elegant look. It should be well ventilated and dangle with beautiful and divine portriats over walls.

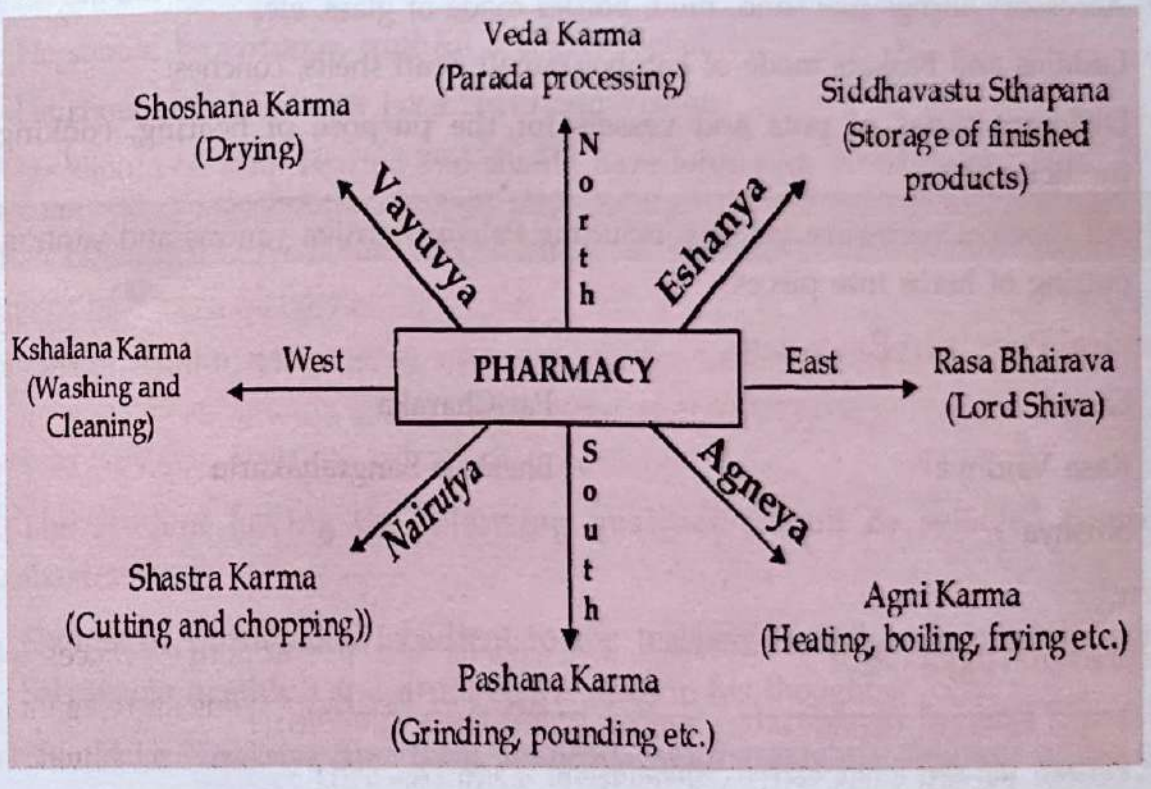
शालायाः पूर्वदिग्भागे स्थापयेद् रसभैरवम्। वन्हिकर्माणि चाऽऽग्नेये याम्ये पाषाणकर्म च।।
नैर्ऋत्ये शस्त्रकर्माणि वारुणे क्षालनादिकम्। शोषणं वायुकोणे च वेधकर्मोत्तरे तथा।।
स्थापनं सिद्धवस्तूनां प्रकुर्यादीशकोणके। पदार्थसंग्रहः कार्यो रससाधनहेतुकः।। (R.R.S. 7/3-5)

Work Division

The working of Rasashala is said to have been divided in the following eight divisions related with eight directions.

1. In the Purva dikh (eastern region) of the Rasashala, a statue of Rasa Bhairava should be installed.

2. In the Agneya dikh (south eastern region), instruments relating to use of fireworks should be placed and perform the pharmaceutical operations involving the use of fire.
3. In the Dakshina dikh (southern portion), the grinding works involving the use of stone (using morter pestle and such other equipments) and instruments used for such purpose should be implemented.
4. In Nairutya dikh (south western part), an arrangement is made for the processes using sharp instruments such as cutting, slicing, etc. and should equipped with such sharp instruments (shastras).
5. In the Paschima dikh (western region), there should be facility for washing, cleaning, etc. where the use of water is required and such activities should be carried out.
6. In the Vayuvya dikh (north western quarter), the drying of the drugs or preparations should be done.



7. In the Uttara dikh (northern region) of the pharmacy, vedhakarmas should be done (the works related to transformation of lower metals into higher metals).
8. In the Eshanya dikh (north eastern quarter) of the the Rasashala, arrangement is made for the storage of prepared medicines or products.

Essential Equipments in Rasashala (R.R.S.7/6-21)

- Heating devices like Satwapatana koshti, Patala koshti, Chala koshti (transferable stoves); 2 each of Bhastrikas (bellows), Mettalic and Bamboo pipes;
- Water Storage Tanks or containers of different sizes;

- Vessels and utensils of different sizes made of Gold, Iron, Copper, Bronze, leather, stones and others; Kundali (circular discs to keep the vessels);
- Pounding and triturating apparatus like different types of Kandani (small pounder), Peshani (Bigger, flat stone for rubbing), Mortars and pestles of different kinds, Taptakhalva etc.;
- Sieves having thousands of tiny holes for filtering the drugs; different types of sieves to filter coarse and fine powders;
- Sharp instruments like Knives, Scissors etc.;
- Materials used for the preparation of musha like mud, tusha (husk), Karpasa (cotton), cowdung cake powder;
- All three types of drugs- Khanija, Moolika, Pranija;
- Fuels like coal, wood, cowdung powder etc.;
- Accessory things like sand, mud, bottles made of glass, etc.;
- Laddles and baskets made of bamboo, small pearl shells, conches;
- Different types of pots and vessels for the purpose of heating, cooking of medicines;
- All types of necessary yantras including Palika, Kamika yantras and yantras for cutting of herbs into pieces.

Essential People in Rasashala

- Guru
- Rasa Vaidhya
- Shishya
- PariCharaka
- Bheshaja Sangrahakarta

Guru

Features of Yogya Guru

आचार्यो ज्ञानवान्दक्षो रसशास्त्रविशारदः। मन्त्रसिद्धो महावीरो निश्चलः शिववत्सलः॥
देवीभक्तः सदा धीरो देवब्राह्मणपूजकः। सर्वमान्यविशेषज्ञः कुशलो रसकर्मणि॥
एवं लक्षणसंयुक्तो रसविद्गुरुरुच्यते। (R.R.S. 6/3-4)

The teacher who teaches Rasashastra should possess the following qualities:-

- He should be knowledgeable, skillful, efficient in Rasashastra both in the theory and practical aspects.
- He should attained siddhi in mantra, brave and have steady mind as well as thoughts.
- He should be worshiper of shiva, religious devotee and involved in the yagna karmas.

- He should always courageous and perfect in his ideas.
- He should be well versed in performing Rasakarmas.

In addition, the author of Rasa tarangini has added other qualities like Sadachara (noble character), Sucharita (good reputation), Samadarshi (Impartial), Sadashaya (noble mind) and Satyavadi (truthful).

Rasa Vaidya

रससंचिन्तका वैद्या निघण्टुज्ञाश्च वार्तिका:।। सर्वदेशजभाषज्ञा: संग्रहाज्ञेऽपि साधके:। (R.R.S.7/24)

धर्मिष्ठ सत्यवाग्विद्वान् शिवकेशवपूजक:।। सदय: पद्महस्तश्च स योज्यो रसवैद्यके। (R.R.S.7/27)

Qualities of a good Rasavaidya are :-

- A Rasa vaidya (physician) must have studied the texts of Rasashastra.
- He should possess proper knowledge in Nighantu Shastra.
- He should be well versed in the languages of all the nearby countries.
- He should be virtuous, truthful and great scholar.
- He should be devotee of Lord Shiva and Vishnu.
- He should be kind hearted and should have lotus sign in his palm.

Shishya

Features of Yogya Shishya

गुरुभक्ता: सदाचारा: सत्यवन्तो दृढव्रता:। निरालस्या: स्वधर्मज्ञा: सदाऽऽज्ञापरिपालका:।।
दम्भमात्सर्यनिर्मुक्ता: कुलाचारेषु दीक्षिता:। अत्यन्तसाधका: शान्ता मन्त्राऽऽराधनतत्परा:।।
इत्येवं लक्षणैर्युक्ता: शिष्या: स्यु: सूतसिद्धये। (R.R.S.6/5-6)

The student having the following qualities should be selected to study Rasashastra:-

- Should be gurubhakta (obedient to the teacher), Sadachara (noble character), Satyavanta (truthful) and drudavratha (firm in his thoughts).
- Should be Niralasya (free from laziness), Swadharmaghna (follower of his own religion) and Sadha jnana paripalaka (always follow the ways of knowledge).
- Should be devoid of dambha (dishonest) and matsarya (jealousy).
- Should have the knowledge of customs and practices of his own culture.
- Should be highly efficient, calm minded and involved in chanting of mantras.

Features of Ayogya Shishya

नास्तिका ये दुराचाराश्शुम्बका गुरुतोऽपरात्। विद्यां ग्रहीतुमिच्छन्ति चौर्यच्छद्मखलोत्सवात्।।
न तेषां सिध्यते किञ्चिन्मणिमन्त्रौषधादिकम् । कुर्वन्ति यदि मोहेन नाशयन्ति स्वकं धनम्।।
इह लोके सुखं नास्ति परलोके तथैव च। (R.R.S.6/8-9)

Person having the following Characteristics is not suitable to become the Student of Rasashastra :-

- One who is Nastika (atheist), Durachara (does not possess noble conduct), Chumbaka (who knows only parts of knowledge in variety of books).
- One who has earned the knowledge from an unworthy Guru by unfair or illegal way.

If such person tries to do Rasa karma, he will loose all his wealth and will be devoid of ihaloka and paraloka sukha.

PariCharaka

सहाया: सोद्यमास्तत्र यथा शिष्यास्ततोऽधिका:। कुलीना: स्वामिभक्ताश्च कर्तव्या रसकर्मणि।। (R.R.S.6/7)

सोद्यमा: शुचय: शूरा बलिष्ठा: परिचारका:। (R.R.S.7/26)

Qualities of the attendant are as follows :-

- He should be diligent and hard working
- He should be clean and hygienic.
- He should be brave enough to carry out the given work efficiently.
- He should be physically strong to endure the heavy load of the unit.

Bheshaja Sangrahakarta

ततद्दौषधनामज्ञा: शुचयो वञ्चनोज्झिता:। नानाविषयभाषाज्ञास्ते मता भेषजाहृतौ।। (R.R.S.7/34)

Person appointed for the task of collection of raw drugs should possess following qualities:-

- He should have the knowledge of the different names of all the drugs.
- He should be clean and posses good conduct.
- He must be faithful and without fraud.
- He should have the good general knowledge and should know to interact in different languages.

Rasa Mandapa

तत्समीपे समे दीप्ते कर्तव्यं रसमण्डपम्। अतिगुप्तं सुविस्तीर्णं कपाटार्गलशोभितम्।।
ध्वजच्छत्रविताना‌ढ्यं पुष्पमालाविलम्बितम्। भेरिकाहलघण्टादिशृङ्गीनादविनादितम्।
भू: समा तत्र कर्तव्या सुदृढा दर्पणोपमा। तन्मध्ये वेदिका रम्या कर्तव्या लक्षणान्विता । (R.R.S.6/14-16)

- Rasamandapa is built near the Rasashala in a place that is samatala (level) and safe.
- It should be spaceous, full of abundant of light beautiful, having pillars, large arches and gates.

- It is decorated with flags, umbrellas, flowers and garlands.
- Music from different instruments like drums, bells, pipes etc., to be heard always.
- The floor of the mantapa must be plain, firm, even, clean and glistening resembling mirror.
- In the center of this mandapa, a dais is to be constructed with all required arrangements for worshiping Rasalinga.

Rasalinga Nirmana

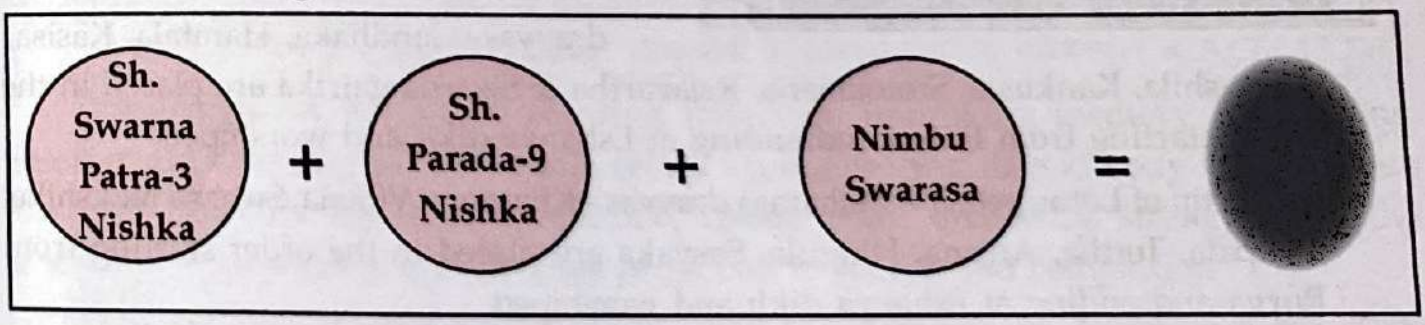
निष्कत्रयं हेमपत्रं रसेन्द्रं नवनिष्ककम्। अम्लेन मर्दयेद्यामं तेन लिंगं तु कारयेत्।।
दोलायन्त्रे सारनाले जम्बीरस्थं दिनं पचेत्। तल्लिंगं पूजयेत्तत्र सुशुभैरुपचारकैः।। (R.R.S.6/17-18)

Ingredients

- Shuddha swarna patra- 3 Nishka (36 gms)
- Shuddha Parada- 9 Nishka (108 gms)
- Nimbu rasa for bhavana- Quantity required

Method of Preparation

- 3 Nishka of Shuddha swarna patra and 9 Nishka of Shuddha Parada are mixed together in khalwa yantra.
- The mixture is subjected to bhavana with Nimbu rasa for 1 yama (3 hours) and Shivalinga is prepared out of it.
- Shivalinga is enclosed in jambeera fruit and subjected to Swedana in Kanji for one day.
- Later Rasalinga is washed with clean water.

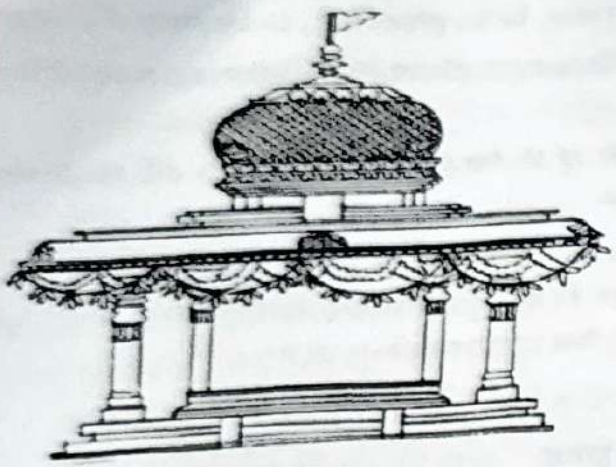


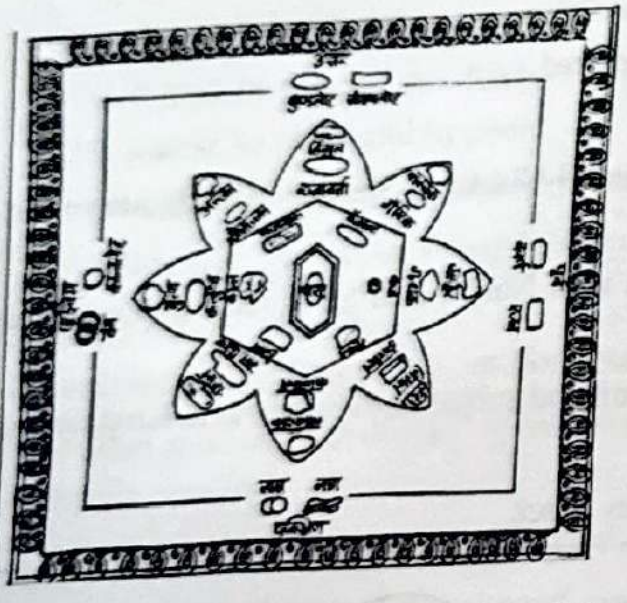
- Then Rasalinga is mounted at the centre of Rasamantapa and worshiped with Aghora mantra and with other rituals.

Rasamantapa Nirmana

कृत्वथ प्रविशेच्छालां शुद्धां लिप्तां सवेदिकाम्। षट्कोणं मण्डलं तत्र सिन्दूरेण द्विहस्तकम्।।
वेदिकायां लिखेत्सम्यक् तद्बहिश्चाष्टपत्रकम्। कमलं चतुरस्रं च चतुर्द्वारैः सुशोभितम्।।
कर्णिकायां न्यसेत्खल्वं लोहजं स्वर्णलेखितम् । तन्मध्ये रसराजं तु पलानां शतमात्रकम्।।
पञ्चाशत्पञ्चविंशद्वा पूजयेद्रसलिङ्गवत् । (R.R.S.6/43-46)

- A square shaped Platform (dais) is made in the Rasamantapa.





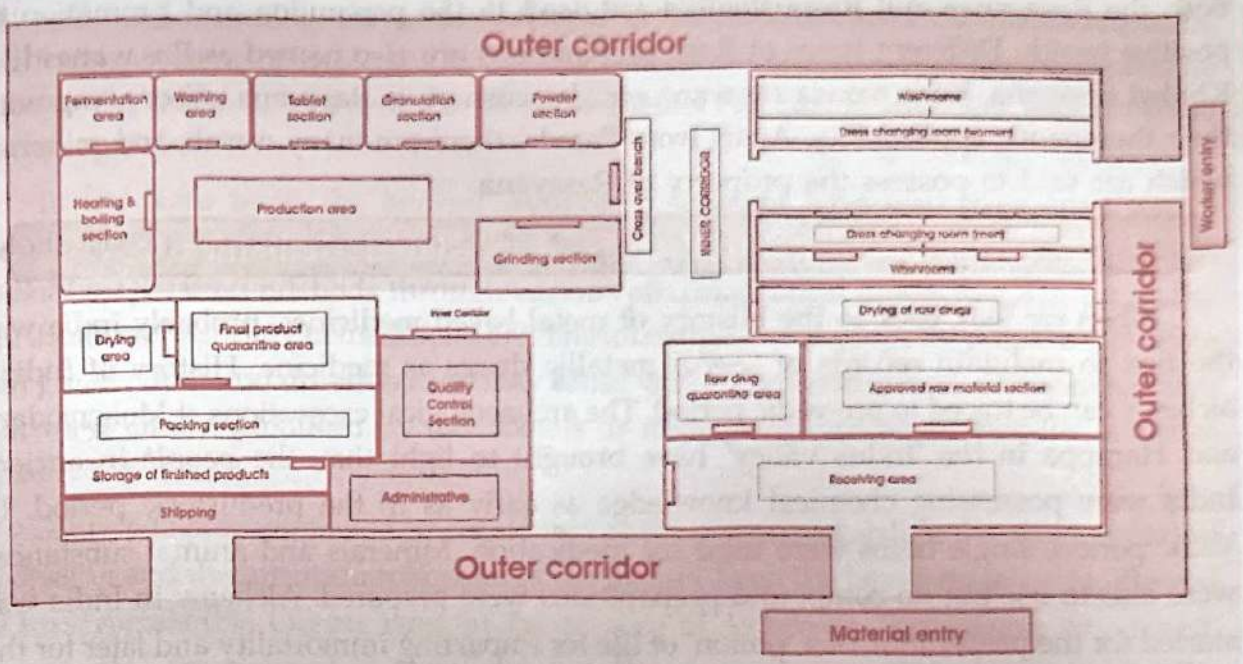
- Over this dais, a mandala having 6 corners measuring 2 Hasta pramana in length and width is drawn by the help of sindoora.
- Outside the Mandala, 8 petaled Lotus is drawn, with four corners and four entrances using the sindoora.
- At the centre of the lotus, an Loha Khalva yantra is placed and scratched with swarna.
- Rasalinga weighing 100 Pala (4800 gms), 50 Pala (2400 gms) or 25 Pala (1200 gms) should be mounted in this Khalvayantra.

Drayvas Placed in Rasamantapa: (R.R.S. 6/47-52)

- At each corners of Mandala, Shakti swaroopa dravya - Vajra, Vaikranta, Vajrabraka, Kanta pashana, Tankana, Bhunaga are placed in the order starting from purva dikh and worshiped.
- On the each petals of lotus, Uparasa dravyas- Gandhaka, Haratala, Kasisa, Manashila, Kankusta, Srotoanjana, Rajavartha & Swarna gairika are placed in the order starting from Purva and ending at Eshanya dikh and worshiped.
- At the tip of Lotus petals, 8 Maharasa dravyas - Kharpara, Vimala, Swarna makshika, Chapala, Tuttha, Anjana, Hingula, Sasyaka are placed in the order starting from Purva and ending at Eshanya dikh and worshiped.
- At the 4 entrances of dais, Swarna and Roupya are placed at the entrance of Purva dikh; Tamra and Seesa at the entrance of Dakshina dikh; Vanga and Kanta at the entrance of Paschima dikh; Munda, Teekshna loha at the entrance of Uttara dikh.
- All the dravyas are worshiped by chanting Aghora and Rasankusha mantras.

Modern Pharmacy

Modern Ayurveda pharmacies are constructed as per the GMP guidelines (described in the Chapter 14)



Concept of Rasa-Rasayana

Rasayana or rejuvenation is the therapy that arrests ageing, eliminates illness and strengthens the sense activities. The concept of Rasayana is there in the Ayurveda since the beginning and its description can be found in samhitas. Rasayana tantra is one among the eight fold (Ashtanga) of Ayurveda. Initially only herbal drugs are used for this purpose, but later metals and mineral preparations are also being used for the purpose of Rasayana.

दीर्घमायुः स्मृतिं मेधामारोग्यं तरुणं वयः। प्रभावर्णस्वरौदार्यं देहेन्द्रियबलं परम्।।
वाक्सिद्धिं प्रणतिं कान्तिं लभते ना रसायनात्। लाभोपायो हि शस्तानां रसादीनां रसायनम्।। (C.S.Chi. 1/ 7-8)

Rasayanas are useful in securing longevity, improving memory, sharpening intelligence, restoring the lost youth, retard ageing process, defend body from various diseases, intensify the body complexion, colour, voice, excellency, strengthening the body and sense organs and bestows perfection in speech and complexion.

The term Rasa refers to the essence which is required for health and life. That which helps to obtain this is Rasayana. In Rasashastra, Rasa generally means the parada and one of the reason for terming it as Rasa is-

जरारुङ्नाभयमृत्युनाशय रस्यते वा रसो मतः। (R.R.S.1/77)

The internal administration of Parada destroys old age, disease and death, which is also the purpose of Rasayana. Preparations of Parada are mainly used for the purpose of Rasayana in the earlier days, so the terms Rasa and Rasayana are used together. Now a days Rasoushadhis are used even to treat wide range of curable and incurable diseases.

Both the Rasayanas and Rasoushadhis are used in the prevention and promotion of positive health. Different types of Rasa preparations are also named as Rasayanas like Khalwi rasayana, Kupi pakwa rasayana etc., because of its Rasayana effect along with their therapeutic applicability. Apart from Parada, there are many metals and minerals which are said to possess the property of Rasayana.

Indians are First to Prepare Metal Based Medicines

When we look back to the History of metal based medicines, probably India was the first to maintain records of useful metallic drugs as medicine. History of Indian alchemy can be traced to pre-vedic period. The archaeological excavations at Mohenjodaro and Harappa in the 'Indus valley' have brought to light that, the people in ancient India were possessing chemical knowledge as early as in the pre-historic period. In Vedic period, single herbs were used for medication. Minerals and animal substances were also in use but no compound preparations were prepared. Alchemy in India was started for the preparation of a 'potion' of life for imparting immortality and later for the transmutation process for converting ordinary metals into gold. Indian alchemy derived its color and flavor largely from the tantric cult. Then, in later centuries, all the previous accumulated alchemical ideas were put to practical use and a number of preparations of mercury and other metals were evolved as helpful accessories in medicine.

It has also been reported that Buddhist sages were using Mercury and believed to be the pioneers in treatment by using metals and minerals in their appropriate form. The usage of metals and minerals was documented in Vedas, which dates back to 5000 B.C.E. Few references of their use are also found in Koutilya Arthashastra even before 300-400 B.C.E. Acharya Charaka of 1500 B.C.E. has mentioned the types of drugs on the basis of source (Audbidha-Herbal, Khanija-Mineral and Pranija-Animal), various formulations and the pharmacology of these drugs. The later treatises describe the medicinal properties of various metals like mercury, gold, lead, etc. Further, the art of preparing the Bhasmas requires certain amount of expertise and this was very well established during the time of Rasashastra which came into the lime light after 8th century and many related literatures like Rasa prakasha sudhakara, Rasa Ratna samucchaya, Ayurveda prakasha etc., are available which incorporate the detailed information of many metals and minerals, their processing and their utility in different diseases.

The metals used as medicine in India include Mercury (Parada), Gold (Swarna), Silver (Rajata), Copper (Tamra), Iron (Lauha), Tin (Vanga), Lead (Naga), Zinc (Yasada), etc. The metallic bhasmas are the result of a range of physico-chemical processes. Various medicinal herbs are made use of in the process of making metallic poison safe. These are regarded as easily absorbable in the human and produce optimum benefit in a minimum dose. Therapeutic effectiveness of these drugs have been established

and well documented by the great Acharyas in the form of classics attributed to them. The Indian system of medicine is the one, out of all traditional medicine system of various civilizations, where importance of metals for curing ailments was probably first recognized.

In the Rasa texts, the ancient Ayurvedic scholars have also mentioned the ill effects of improperly prepared metallic preparations and emphasis has been given to rational preparation methods through various pharmaceutical processing like Shodhana (purification), Marana (incineration), etc. Bhasmas that are improperly prepared, bhasma with greater dose and duration level may cause various adverse effects. The management of adverse effects produced by raw metals or improperly processed metallic bhasmas are also mentioned.

Ayurveda perhaps should be considered as the pioneer regarding the pharmaceutical processing and therapeutic application of the metals. Even the heavy metals (Hg, Pb) and the toxic metals (Pb, Cu) are used in the practice of Ayurveda. Samaskaras (Shodhana, Marana, etc.) are claimed to make the metallic preparations relatively non-toxic. The recent studies reported that the metallic bhasmas are biologically produced nanoparticles and these studies help to explain the common properties of the bhasmas like Rasayana (immunomodulator), Yogavahi (targeted drug delivery), etc. The pharmacology of metals described in Ayurvedic system of medicine is based on keen observation, theories, beliefs and experiences of the great ancient Acharyas.

Recent Development in Ayurvedic Pharmaceuticals

Ayurvedic medicine manufacturing was almost always a family run activity with the details of manufacturing processes being closely guarded for efficient quality management. Although, Ayurveda as system of medicine has been in practice in India for thousands of years but its growth as an industry commenced only a few decades back.

Probably until the 19th century, Ayurvedic medicines were prepared by practitioners at their homes. This practice still continues for very specialized preparations passed down family traditions. Household level drug preparation using traditional tools and principles cannot meet the growing demand for herbal products both in terms of numbers as well as convenience in dosage forms. Today, there are more than 9000 traditional drug manufacturing units in the country. The processes used have mostly been a direct mechanization of traditional processing equipment or have been adapted from the food, chemical or pharmaceutical sector. These new technology development can be considered as a boon for processing traditional medicines to improve the dosage forms and scaling up while maintaining the principles similar to that of traditional techniques. For example, conversion of kashayas to freeze-dried/vacuum dried powder/ tablets are in vogue in today's Ayurveda pharmacies.

The evolution of pharmaceutical techniques and inventing varied forms of medicines is witnessed in present pharmacies. The motives that shaped the ayurvedic pharmacy may be listed as follows :

1. Enhance palatability of medicine
2. Minimise the dose
3. Perennial supply of medicines
3. Decentralized production allowing localized traditions
4. Opportunity to invent new formulations

Incorporating modern equipments in modern pharmacies

Due to advance technology, Ayurveda pharmacy improved and advanced a lot and has also become efficient. Moreover the use of disintegrator, grinder, pulverizer, mixer, end runner, edge runner has made the manufacturing more efficient, more reliable, increased the production etc. In the present pharmacies, the modern equipments had replaced most of the ancient instruments. Some of them are:

Ancient equipments	Modern equipments used in pharmacies
Dola yantra	Steam jacketed vessels
Khalwa yantra Ullukala Yantra	Mixer, Wet grinder, Pulveriser, Disintegrator, Ball mill, Edge and end runner mill, Colloid mill
Chullika (stove) using various fuels	Steam jacket boilers, Electric boilers, Hot plate
Angara koshti	Steam cooker
Khalva yantra for Manual mixing	Tumbling mixers/blenders, Ribbon mixer, Planetary mixer orbiting
Manual churner	Mechanical churner
Arka yantra	Different types of distillation apparatus like simple-fractional-steam-vacuum distillation
Puta yantra	Horizontal muffle furnace/Programmed muffle furnace
Bhatti	Vertical muffle furnaces
Musha	Crucibles
Darvika yantra, Palika yantra	Mechanised ladles

Modification of dosage forms

The advent of commercialization in Ayurvedic medicines at national and international levels lead to large scale manufacturing. So today modification becomes indispensable in a bulk manufacturing unit and therefore done to make different

formulations from the Panchavidha Kashaya Kalpana and secondary preparations. The major processes involved in the modification of the primary dosage forms include drying of the raw drug, heating of the formulation and thereby making it into thicker consistency, addition of sweetening agents, fermentation, packing and containers used in storage or preservation.

Modification are done mainly for increasing palatability, shelf life, adopting to market standards, compatibility-patient compliance, global acceptance, easy administration, dosage fixation. Modification can be done by improving appearance, form, increasing therapeutic utility or potency, by simplifying dispensing and portability and by increasing palatability. Many new ways of presentation have started in the different dosage form, by using modern machineries, packaging, preservatives etc. We can see the transformation of classical preparations into modified forms like tablets, capsule, syrup, etc. These kinds of modifications are the result of industrialization.

Classical preparations	Modification
Agni sidha swarasa Anagni swarasa	Ghana vati, Syrup, Dry powder (sunlight, vaccum dry), Juice (tetra pack) Pouch pack of dry powder
Kalka	Churna, Tetra pack of kalka (mainly for preservation) Pouch pack
Kashaya	Tablet, Ghana vati, Syrup, Arishta, arka
Hima And Phanta	Syrup, Pouch pack
Churna	Compressed tablet
Taila and Ghrita (internal use)	Soft gelatin capsules
Taila and Ghrita(external use)	Ointment, Cream, Linnaments, Spray
Rasoushadhis	Tablets, Capsules
Lepa kalpanas	Ointment, Cream, Gel, Lotion

The recent trend in traditional medicine dosage forms is to enhance the solubility, bioavailability, pharmacological activity, stability, reduce the toxicity and increase the compliance, etc. Oral dosage form which can address these factors are granules (effervescent and rapid release granules), tablets (fast dissolving and rapid disintegrating tablet, coated tablets), capsules, Lozenges, suspension, syrups, Emulsions etc. and topical dosage form includes toothpaste, gum gel, natural hair dye, face pack, hand wash, Sanitizers, Moisturisers, liniment, Pain balm, spray and roll-on, gel, creams (emulsion), shampoo, etc. Contemporary, traditional pharmacies including several Ayurvedic pharmacies have already implemented these new trends and launched several new dosage forms apart from traditional under cover of conventional knowledge.

The new pharmaceutical companies are now bringing out huge number of Ayurvedic proprietary medicines. The new age Ayurveda now looks ahead to replace some of the western medicines with the ayurvedic ones. The new approach in the formulation of Ayurvedic brand medicines is received by the society positively. The new trend in the branded Ayurvedic medicines is combining two or more classical ayurvedic medicines into a new brand.

Quality Control

The use of powerful modern analytical tools to probe the complexities of Ayurvedic Pharmaceutics, could allow natural product based drug development to effectively integrate ancient wisdom and modern technology. Quality Control forms the most essential part in ensuring G.M.P. As per the schedule T, every Pharmacy licensee is required to provide facility for quality control section in his own premises or through Government-approved testing laboratory. So all pharmacies are adopting quality control measures at all the levels of their production. The quality control section will verify all the raw materials, monitor in process, quality checks and control the quality of finished product being released to finished goods store/warehouse. The test will be as per the Ayurveda pharmacopoeial standard. Where the tests are not available, the test should be performed according to the manufacturer's specification or other information available. The application of analysis of the genetic profile of plants is gaining inclusion in state and commercial analytical laboratories. The authentication of medicinal plants through DNA barcoding is a gold standard that has been successfully applied to detect adulteration in several high-value species.

The Ayurvedic Pharmacopoeia of India (API) and Ayurvedic Formulary of India (AFI) published by Government of India are providing standards for the raw drugs and manufacturing process. These helps to assess the range of ayurvedic medicines and to bring homogeneity and uniformity in practice. Such formulary would bring uniformity in identifying herbs, preparing formulations and their therapeutic use.

CGMP (Current Good Manufacturing Practices) in the Pharmaceutical Industry

Now a days, many Ayurveda pharmaceutical companies are upgrading from GMP to CGMP. The major difference between GMP and CGMP is that CGMP is focused on continuous improvement and means the most up-to-date standards and technologies are being employed to assure highest quality standards, whereas GMP is the basic regulation with a set of principles that help manufacturers for being proactive in developing safe and effective products.

Current good manufacturing practices (CGMPs) are regulations set forth by the FDA to ensure proper design, monitoring, and control of manufacturing processes and facilities. They require pharmaceutical companies to establish a comprehensive quality

management system, source quality raw materials, implement robust standard operating procedures (SOPs), investigate product deviations, and maintain reliable testing facilities. The latest CGMP was published in 2016. The CGMP regulations for drugs contain minimum requirements for the methods, facilities and controls used in manufacturing, processing, and packing of a drug product. The regulations make sure that a product is safe for use and that it has the ingredients and strength it claims to have.

While the FDA oversees CGMP regulations in the U.S., the European Medicines Agency (EMA), conducts GMP inspections in Europe, ensuring the harmonized interpretation of GMP requirements across member states.

The CGMP regulations, in accordance with FDA guidelines, are designed to certify the strength, quality, and purity of products. Manufacturers are expected to conduct regular inspections of their processes, implement consistent quality management systems, source the highest quality raw materials, and detect and investigate any product deviations. They must also maintain reliable equipment and facilities while strictly adhering to well-documented management and manufacturing procedures. QMS software plays a pivotal role in making these audits and inspections not only manageable but efficient. One significant aspect of this is the QMS software's capability to maintain comprehensive and accessible records. QMS software offers streamlined, centralized documentation management to ensure every process, procedure, and product detail is meticulously recorded and easily retrievable. This not only simplifies audits but reduces the risk of non-compliance due to lost or inaccessible records.

Discussion

Since the evolution of human, herbs were natural part of human food choices. Later, they started using herbs for the purpose of healing as well. Initially he consumed the plants in their natural form which marks the origin of Ayurveda. As he grew cultured and intelligent by his experience, he tried to make those medicinal plants more palatable & more pleasing to his sense organs. This led to the origin of usage of herbs for treating diseases and laid the foundation to the Ayurvediya Aaushadhi nirmana. With the advent of Mercury, a miracle substance in those days, a new class of drugs termed as 'Rasaushadhi' with a new science termed as Rasashastra appeared on the horizon of Ayurvedic system of medicine. In today's scientific parlance Rasashaastra can be equated with 'Iatrochemistry'. Although Rasashastra deals with therapeutic processing and use of all minerals and metals, the study is dominated by knowledge about mercury and techniques of its processing.

In the period of Naagaarjuna, apart from introduction of Mercury in therapeutics a remarkable change occurred in the method of preparation of mineral and metallic drugs. In Samhita period the formulation of mineral and metallic preparation was restricted to preparation of fine metallic powders obtained by quenching red hot

thin metal sheets in medicated liquids. The drugs of mineral origin are in use for therapeutics but during that period their numbers were very much limited probably on account of non development of suitable and sophisticated pharmaceutical procedures, techniques and processes necessary for their conversion to suitable dosage forms. In post Samhita period, a new class of drug- form termed as Bhasma came into existence in the science of Ayurvedic Pharmaceutics, with introduction of two new techniques, Shodhana and Maarana. The mastering of the art of Bhasma preparation heralded the era of use of relatively safe and effective mineral and metallic drugs by the physicians. Presently Ayurvedic pharmaceuticshad grown up with knowledge of chemistry and its allied branches, modern technologies and their application in drug production, and standardization procedures for global acceptance and fulfill demands of modern era.

Conclusion

By studying the chronological development of ayurvediya aushadhi nirmana one can understand the importance of History and can be known that how the aforesaid theory gradually developed into a practical science in ancient times with the contribution of various great Acharyas and now growing into an more advanced science by incorporating the present technologies to all its Herbal and Herbo mineral preparations resulting in world wide acceptance.

Extended Learning

- Describe structure of Pharmacy and enlist formulations prepared in pharmacy, after visiting the unit of teaching pharmacy of own campus.
- Justify design of ancient Rasashala

References

- Prasanta Kumar Sarkar at el., Ancient concept of metal pharmacology based on Ayurvedic literature, Ancient Science of Life, Vol. 29, No.4 (2010) Pages 1-6.
- https://www.fda.gov/drugs/pharmaceutical-quality-resources/current-good-manufacturing-practice-cgmp-regulations.

MODEL QUESTIONS

Short Answers

- Write the Definition and etymology of Rasa and importance of Rasoushadhis.
- Explain the History of Rasashastra and contribution of any one important classics of Rasashashtra with its contributions.
- Define the term Bhaishajya Kalpana and discuss in brief about the development history of Bhaishajya Kalpana
- Write in brief about history & chronological development of rasashastra from vedakala to aadhunika kala.
- Explain the Concept of Rasamandapa.
- What is Rasashala? Describe it as per Ancient or modern aspect.
- Give the details of Recent development in Ayurvedic Pharmaceuticals
- Define rasa and describe its importance.
- Define term Bhaishajya Kalpana. Importance of Bhaishajya Kalpana in detail.
- Complete the verse and Explain it : अल्प मात्रोपयोगित्वात्.....।
- Explain it : "सिद्धे रसे करिष्यामि निर्द्रारिद्रयं इदं जगत्" Describe about contribution of Nagarjuna Acharya to Rasashastra.
- Describe the unique features in short about Rasa tarangini.
- Describe about contribution of Sharanghadhara to the field of Bhaishajya Kalpana.
- Write about Rasa ratna samuchchaya.
- Importance of rasaushadhis in modern era.
- Discuss- rasa shastra, the science of 21st century.
- Explain the Concept of Rasa-Rasayana.
- Describe building of Pharmacy as per morden aspect.
- Describe Rasa Shala Nirmana as per classical reference.
- Describe Rasa shastra in Samhita period.
- Defend that the Indians are first to prepare metal based medicines.

CHAPTER 2

PARIBHASHA (TERMINOLOGY)

PAPER 1

Contents

- Definition and Importance of Paribhasha
- Word Derivation- Aushadha, Bheshaja, Kalpana, Kashaya, Pancha kashaya Yoni, Samskara
- Dravya/Varga Paribhasha- (Classical Names, English names, Chemical Composition/ Formula)

i) Rasa, Maharasa, Uparasa, Dhatuvarga, Upadhatu, Ratna, Uparatna, Sudhavarga, Sikatavarga, Lavanavarga, Visha, Upavisha, Kajjali, Mitrapanchaka, Dravaka Gana

ii) Sandigdha (Contraversial): Vaikranta, Chapala, Rasanjana, Pushpanjana, Vahnijara, Girisindura, Kankushtha.

iii) Anupalabdha (Not Available): Rasaka, Sauviranjana

iv) Krutrima (Artificial): Sasyaka, Gandhaka, Kasisa, Rasanjana, Hingula

v) Pratinidhi (Substitute) : Vajrabhave Vaikranta, Suvarna-Suvarna Makshika

- Prakriya Paribhasha-

i) Shodhana: Types of Shodhana, Samanya Shodhana, Vishesha Shodhana, Different techniques used for Shodhana, Swedana, Mardana, Dhalana, Nirvapa, Nirjaleekarana, Nimajjana, Bhavana, Bharjana

ii) Marana: Definition, Importance of Marana, Types of Marana- Agnipaka Method, Putapaka Method, Kupipakwa Method, Bhanupaka Method, Swanga Sheeta

iii) Amrutikarana, Lohitikarana

iv) Sattvapatana, Shuddhavarta, Beejavarta

v) Druti: Definition, Druti lakshana

vi) Parada Samskara: Definition, Importance, Ashtasamskara Parada, Jaranaa, Murchchhana, Names of Parada Bandhas

- Pramanikarana Paribhasha (Terms for Standardization)-

i) Grahya-Agrahyattva, Siddhilakshana

ii) Bhasma pariksha: Varitara, Rekhapurnata, Unama, Slakshnattva, Sukshma, Anjana Sannibha, Dantagre na Kachakacha Bhavati, Varna, Avami, Apunarbhava, Niruttha, Gata Rasattva, Nischandrattva, Niramlattva, Nirdhumattva, Jihvagre adahyamanattva, Dadhi/ Nimbu Pariksha,

- Puraka Paribhasha (Supplementary): Rudra Bhaga, Dhanvantari Bhaga
- Mana-Paribhasha:

i) Definition, Classical Types

ii) Classical and Modern- Conversion chart as per AFI, Scientific Metrology

iii) Essential Kala- mana.

CHAPTER TWO

Learning Outcome

At the end of this chapter, students can able to

1. Explain the term Paribhasha and its importance in Ayurvediya Aushadhi Nirmana.
2. Discribe the terms Aushadha, Bheshaja, Kalpana, Kashaya, Kashaya yoni, Samskara- based on their word derivations
3. Name all drugs classified in the varga (group)- Maharasa, Uparasa, Sadharana Rasa Varga from Rasaratnasamuchchaya
4. Describe the definition of the term Shodhana. Explain with examples of different techniques used for the procedures of Shodhana.
5. Explain the term Marana and describe its types with examples
6. Explain the names of Parada Ashta samskara, terms Jarana Murchchhana and cite types with examples. Compare Jarana and Murchchhana
7. Identify names of Parada Bandhas
8. Explain the importance of Mana-paribhasha and classical types of Mana

Introduction

Many words posses different literal meaning, but their scientific meaning pertaining to particular science is specific. These technical words are known as Paribhasha (Terminologies). परित:भाषतेयासापरिभाषा means the complete and clear knowledge of any terms is called as Paribhasha. Knowledge of these terminologies is necessary for proper understanding of the subject as well as right interpretation of the concepts.

Definition

निगूढानुक्त लेशोक्त सन्दिग्धार्थ प्रदीपिका। सुनिश्चितार्था विबुधैः परिभाषा निगद्यते।। (R. T.2/2)

अव्यक्तानुक्त लेशोक्त सन्दिग्धार्थ प्रकाशिका:। परिभाषा प्रकथ्यन्ते दीपीभूता: सुनिश्चिता:।। (V.P.)

The technical terms explains the meaning of words which are unexpressed, untold, incompletely told and ambiguous. Paribhasha throws the light on these type of words and definitely helps to understand them just as the light enlightens the things in the dark.

Importance

भवेत्पठितवारोऽयमध्यायो रसवादिना। रसकर्माणि कुर्वाणो न स मुह्यति कुत्रचित्।। (R.R.S. 8/99)

The Rasavaidya must read the Paribhasha chapter repeatedly and should be well versed with all Paribhasha. This will definitely helps in avoiding the mistakes possibly occur during Rasakarma.

- Paribhasha helps to clearly understand the science of Rasashastra.
- To attain respect, superiority and perfectness in Rasasiddhi, one should have the clear knowledge of Paribhasha.

Word Derivation

Aushadha

ओसो नाम रसः, सो अस्यां धीयते यत् तद् ओषधिः। ओसाद् आरोग्यमाधत्ते तस्मात् ओषधिरौषधः।।

(K.S. Khila 5/2)

In the word Aushadha, 'Osa' refers to Rasa and this Rasa is the intrinsic property of a drug. Proper usage of this Rasa will bestows the health and hence it is termed as Aushadha.

भेषं रोगं जयतीति औषधं इत्यमरः ।। (S.K.D)

Aushadha is a substance which wins over the disease and impart health.

Bheshaja

तदेव युक्तं भैषज्यं, यदारोग्याय कल्पते ।। (C.S. Sutra 1/34)

Bheshaja is applicable to the dravya which helps to bring back the body to healthy status.

भैषज्यति चिकित्सति रोगान् विवर्तयति वा अनेन इति भेषजं ।। (S.K.D)

Bheshaja is that which helps in treating the disease or helps in modifying the disease condition, to bring back the body to normal state.

Kalpana

कल्प्यते विधीयते असौ विधिः ।। (S.K.D)

प्रकल्पनं सम्स्करणम् इति। (Chakrapani)

कल्पनं योजनमित्यर्थः। (Arunadatta)

शरीरे प्रयोगार्थं पेषण तोयाग्न्यादि योगेन। संस्करण मानेन इति कल्पना। (Chakrapani)

The word kalpana means method/process or transformation/conversion/modification procedures/preparation of medicines by using either a single drug or a combination of several drugs by grinding, pounding, heating, frying, boiling etc carried out to make the drug fit for internal administration and to fulfill the patient's compliance.

KALPANA means the ideology of making use of different dravyas. It is the process or modification through which a substance is transformed into a suitable form to admnister as medicine. The raw products obtained from animal, plant or mineral source is to be converted into that form, by which it would be therapeutically fit for use.

Kashaya

"के शरीरे स्यति यन्त्रणं इति कषायः।" (Ka.S. Khi)

Kashaya is a preparation which sustains the body by removing or correcting the vitiated doshas.

कण्ठस्य कषणात् प्रायो रोगाणां वापि कर्षणात् कषायशब्दः प्रथान्यात् सर्वरोगेषु कल्प्यते । (K.S. Khila 3/29))

Kashaya is a drug or the substance which irritates the throat and in the same way it disturbs the disease manifestation, alleviates the disease and brings back the normalcy of the vitiated doshas into healthy condition.

Pancha Kashaya Yoni

पञ्च कषाययोनय इति मधुरकषायोऽम्लकषायः कटुकषायस्तिक्तकषायः कषायकषायश्चेति तन्त्रे संज्ञा ।।
(Ca.Su 4/7)

पञ्च रसः लवण वर्जिताः। (अ.ह.कल्प. 6)

As per Charaka samhita, the name Kashaya pertains to 5 kashaya rasas (except lavana rasa among shadrasas) of the drugs from which the kashaya kalpanas are prepared. Lavana rasa is excluded from this, because independent preparation cannot be made from lavana rasa. Lavana rasa is in the form of a dry substance and does not have any kashta yoni (Herbal source). It dissolves when the water is added to it. It does not contain any volatile principles and also cannot be heated to make any new preparation. Other five rasas have many sources, that is of herbal origin. So fundamental preparations are only five in number.

SOURCE (YONI)	KASHAYA KALPANA
Madhura Rasa	Madhura Kashaya
Amla Rasa	Amla Kashaya
Katu Rasa	Katu Kashaya
Tikta Rasa	Tikta Kashaya
Kashaya Rasa	Kashaya Kashaya

Samskara

संस्कारो हि गुणान्तराधानमुच्यते ते गुणाः तोयाग्नि सन्निकर्ष शौच मन्थन।
देश काल वासन भावनादिभिः काल प्रकर्ष भाजनादिभिः धीयन्ते। (C.S. Vimana 1/21)

Samskara is the processing by which drugs will be added with different property or quality to make it more potent and fit for therapeutic administration.

Samskaras are of different types comprising Toya sannikarsha (contact with liquid), Agni sannikarsha (contact with heat), Soucha (Washing/Cleaning), Manthana (Churning), Desha (placing the drug in specific atmospheric condition), Kala (storing the drugs for a specific time), vasana (flavoring), Bhavana (trituration), Kala prakarsha (Preservation), Bhajana (containers) and others.

Importance

- Samskara enhances the property of the drug by adding different qualities to it.

अल्पस्यापि महार्थत्वं प्रभूतस्यात्प कर्मता। कुर्यात् सम्योग विश्लेष काल सम्स्कारं युक्तिभिः।।

(C.S. Kalpa 12/48)

Samyoga, Vishlesha, Kala and other Samskaras are capable of making a simple drug into a more effective and potent drug when applied judiciously.

Dravya / Varga Paribhasha

Rasa

रसनाद् सर्वधातूनां रस इत्यभिधीयते। जारणद्रुमृत्युनाशाय रस्यते वा रसो मतः ।। (R.R.S.1/76)

It is called Rasa since it can engulfs all the metals and minerals like Swarna, Abhraka etc. Also, it is called Rasa, as it is capable of eradicating jara (senility), rukh (diseases) and mrutyu (Death).

Maharasa

The term Maharasa denotes a group of drugs of mineral origin.

Rationality Behind the Classification of Maha Rasa, Uparasa and Sadharana Rasa

Following hypothesis can be drawn based on which the classifications might have been done.

- Drugs are grouped according to their utility in the process of Parada.
- Based on their therapeutic property.
- Depending on the satva (Metallic essence) they contains.
- Based on their capability of sustaining heat.

Maharasa According to Rasa Ratna Samuchhaya

अभ्रवैक्रान्तमाक्षीकविमलाद्रिजसस्यकम् । चपलो रसकश्चेति ज्ञात्वाऽष्टौ संग्रहेद्रसान् ।। (R. R. S. 2/1)

Drugs of Maharasa, their english name and their chemical composition/Formula are as below:

S.No.	Classical Name	English Name	Chemical Composition/Formula
1	Abhraka	Glimmer, Mica	$K(Mg, Fe)_3 (Si_3 AlO_{11}) (OH)_2$
2	Vaikrantha	Tourmaline	$Na(MgFeMnLiAl)_3 Al_6 (B_3O)_3 (Si_6O_8)$
3	Makshika	Chalco-pyrite	$CuFeS_2$
4	Vimala	Iron pyrite	FeS_2
5	Shilajatu	Black bitumen	
6	Sasyaka	Peacock ore, Blue Vitriol	Copper Sulphate/$CuSO_4 7H_2O$

7	Chapala	Selenium	Se
8	Rasaka	Calamine	Zinc ore (ZnS, ZnO, $ZnCO_3$)

Uparasa

The term 'Upa' refers to 'secondary'. According to Monier williams dictionary, Uparasa are the secondary minerals.

Definition of Uparasa

उपमिति रसेन। उपधातु। (S.K.D.)

उपमितौ रसेन। तुलेषु गन्धकादिषु।। (वाटास्पत्यम)

So, Uparasas are the set of minerals which are secondary to Maharasa

Uparasas According to Rasa Ratna Samuchhaya

गन्धाश्मगैरिकासीसकाङ्क्षीतालशिलाञ्जनम् । कङ्कुष्ठं चेत्युपरसाश्चाष्टौ पारदकर्मणि ।। R.R.S.3/1

Classical name of Uparasa, their English name and their chemical composition/ Formula are as below:

S.No.	Classical name	English name	Chemical composition/Formula
1	Gandhaka	Sulphur	S
2	Gairika	Red ochre	Hematite/Fe_2O_3
3	Kasisa	Green Vitriol	Hydrated Ferous Sulphate $FeSO_4.7H_2O$
4	Kankshi	Alum	Potassium Aluminum Sulphate/$K_2SO_4 Al_2 (SO_4)_3.24H_2O$
5	Haratala	Orpiment	Arsenic trisulphide/As_2S_3
6	Manahshila	Realgar	Arsenic disulphide/As_2S_2
7	Anjana	Collyrium	--------
8	Kankustha	Gambose Tree	Garcinia Morella (Latin name)

Sadharana Rasa

Sadharana rasa is the group of the drugs which includes animal and herbal sources of drugs along with mineral drugs.

साधारणं अविशेषेणा कार्यादिभारधारणं तेन सह वर्तते इति, समानः। सामान्यम्।। अनेक सम्बन्ध्येकवस्तु।
(S.K.D.)

The word Sadharana means not special, less important, similar, common. In Monier Williams dictionary, Sadharana means General.

Sadharana Rasa according to Rasa Ratna Samuchhaya

कम्पिल्लश्चापरो गौरीपाषाणो नवसादरः । कपर्दो वह्निजारश्च गिरिसिन्दूरहिङ्गुलौ।।
मृद्दारशृङ्गमित्यष्टौ साधारणरसाः स्मृताः। (R.R.S.3/120-1215)

Drugs of Sadarana rasa, their English name and their chemical composition/ Formula are as below:-

S.No.	Classical name	English name	Chemical composition/ Formula
1	Kampillaka	Indian Kamala	Mallotus phillippinensis (Latin name)
2	Gauri pashana	White Arsenic	Arsenic trioxide/As_2O_3
3	Navasadara	Ammonium salt	Ammonium chloride/NH_4Cl
4	Kaparda	Cowrie	Calcium carbonate/$CaCO_3$
5	Agnijara	Ambergris	
6	Giri sindura	Red oxide of Hg	Mercuric oxide/HgO
7	Hingula	Cinnabar	Mercuric Sulphide/HgS
8	Mriddara Shringa	Litharge	Lead Monoxide/PbO

Dhatuvarga

Dhatu varga includes few selected metals which have significant therapeutic application. In Rasashastra, the words Dhatu and Loha are used as the synonyms.

Definition

Loha

Loha shabda is derived from 'luh' dhatu.

धातुर्लोहे लुह् इति मतः सोप्यकर्षार्थवाची। (R.R.S. 5/1)

Dhatus are called by the name Loha as they are extracted out from their respective ores. This can also be interpreted as it extracts out the diseases from the body when used judiciously, so termed as Loha.

Dhatu

वलि पलित खालित्य कार्श्य अबल्य जरामयान्। निवार्य दधते देहं नृणां तद्धातवो मताः।। (A.P. 3/2)

Dhatu is that which cures the diseases like Vali (premature wrinkles), Palita (premature greying of hairs), Khalitya (hairfall), Karshya (emaciation), Abalya (weakness), Jaramaya (geriatric disorders) and brings stability to the body.

Dhatu Classifiaction/Types

शुद्धं लोहं कनकरजतं भानुलोहाश्मसारम्। पूतीलोहं द्वितयमुदितं नागवङ्गाभिधानम्।।
मिश्रं लोहं त्रितयमुदितं पित्तलं कांस्यवर्तम् । (R.R.S. 5/1)

S.No	Classical name	English name	Scientific name / Composition / Formula
1	Swarna	Gold	Aurum/Au
2	Rajata	Silver	Argentum/Ag
3	Tamra	Copper	Cuprum/Cu

4	Loha	Iron	Ferrum/Fe
5	Naga	Lead	Plumbum/Pb
6	Vanga	Tin	Stannum/Sn
7	Yashada	Zinc	Zinc/Zn
8	Kamsya	Bronze	Copper + Tin (Cu+Sn)
9	Pittala	Brass	Copper + Zinc (Cu+Zn)
10	Vartaloha	Five metal alloy/ Panchaloha	Bronze+Zinc+Cu+Pb+Sn

Upadhatu

Upadhatus are the drugs which possess the qualities similar(bit lesser) to the dhatus. These Upadhatus will have the qualities of the dhatus they contains and hence if the dhatus are unavailable, the respective upadhatus can be used as substitute.

Upadhatus according to Ayurveda Prakasha are-

ताप्यं च विमला तुत्थं कांस्यं पित्तलकं तथा। सिन्दूरं शैलनिर्यासः स्मृताः सप्तोपधातवः।। (A.P. ¾-5)

S.No.	Classical name	English name	Chemical composition / Formula
1	Swarna makshika	Copper pyrite	$CuFeS_2$
2	Rajata makshika	Iron pyrite	FeS_2
3	Tutha	Copper sulphate	$CuSO_4.7H_2O$
4	Kamsya	Bronze	Copper + Tin (Cu+Sn)
5	Pittala	Brass	Copper + Zinc (Cu+Zn)
6	Sindura	Red oxide of Hg	Mercuric oxide/HgO
7	Shilajatu	Black bitumen	

Ratna

Ratnas (precious stones) are the pieces of mineral crystal which, in cut and polished form, is used to make jewelery or other ornaments because of their luster or other physical properties that have aesthetic value. Rarity is another characteristic that lends value to a gemstone.

Nirukti

'जातौ जौ यदुत्कृष्टं तद्धि रत्नं प्रचक्षते। रत्नं च वरपाषाणं रमन्ते यत्र मानवाः'।। (Raghuvansham)

Ratnas are those which are considered as the best with regards to qualities and properties in their respective groups.

रमणीयतरं यस्माद्रमन्तेऽस्मिन्नवतीव वा। तस्माद्रत्नमिदं ख्यातं शब्दशास्त्रविशारदैः।। (R.T.23/1)

CHAPTER TWO

That which is more beautiful and that which gives more pleasure is named as Ratna by the scholars of shabda shastra

दर्शनीये तथा हर्षे रत्नमेतन्निरुक्तवित् यत्। अतो रत्नमिति प्रोक्तं शब्दशास्त्रविशारदैः।। (A.P. 5/2)

All the people who wish to have more wealth and richness are very much attracted and delighted with these precious stones. So the eminents of shabda shastra termed this as Ratnas.

Nine Ratnas have been described by Rasa Acharyas. These are :

माणिक्यमुक्ताकाविद्रुमाणि तार्क्ष्यञ्च पुष्पं भिदुरञ्च नीलम्।
गोमेदकञ्च विदुरञ्च क्रमेण रत्नानि नवग्रहाणाम्।। (R.R.S.4/5)

S.No	Classical name	English name	Chemical composition/Formula
1.	Manikya	Ruby	Al_2O_3
2.	Mukta	Pearl	$CaCO_3$
3.	Pravala	Coral	$CaCO_3$
4.	Tarkshya	Emerald	$Be_2Al_2(SiO_3)_6$
5.	Pushparaga	Yellow Sapphire	Al_2O_3
6.	Vajra	Diamond	C
7.	Nilam	Blue Sapphire	Al_2O_3
8.	Gomeda	Zircon/Cinnamone stone	$ZrSiO_4$
9.	Vaidurya	Cats eye	$BeAl_2O_4$

Uparatna

Uparatnas are semiprecious stones.

Names of the Uparatnas

वैक्रान्तं सूर्यकान्तश्च चन्द्रकान्तो नृपोपलः। पेरोजकञ्च स्फटिकं क्षुद्ररत्नगणो ह्ययम्।। (R.T.23/154)

S.No	Classical name	English name	Chemical composition/Formula
1	Vaikanta	Tourmaline	$KAlSi_3O_8$
2	Suryakanta	Sun stone	$(Ca,Na)\ (Al,Si)_2Si_2O_8)$
3	Chandrakanta	Moon Stone	$KAlSi_3O_8/NaAlSi_3O_8$
4	Rajavarta	Lapis lazuli	$Na_4(NaS_3Al)Al_2(SiO_4)_3$
5	Perojaka	Turquoise	$CuAl_6(PO_4)4(OH)_84H_2O$
6	Sphatikamani	Quartz	SiO_2
7	Trinakanta	Amber	$C_{10}H_{12}O$(Fossilized plant resins)
8	Palanka	Onyx	SiO_2

9	Putika	Peridot	$(Mg,Fe)_2SiO_4$
10	Rudhira	Carnelian	SiO_2

Sudha Varga

Sudha varga dravyas are group of drugs that possesses high calcium content in them. The word "Sudha" is to denote 'Limestone', which is one among the calcium compound. Calcium is the most abundant mineral in the human body which plays pivotal role in human physiology. These drugs are white in colour, hence also called as Shukla varga dravyas, where the term "Shukla" means white colour.

Drugs which are included in Sudha varga, their English name, and their chemical composition are as below:

S.No	Classical name	English name	Chemical composition/ Formula
1.	Sudha	Lime	CaO
2.	Khatika	Chalk	$CaCO_3$
3.	Godanti	Gypsum	$CaSO_4$ $2H_2O$
4.	Shankha	Conch Shell	$CaCO_3$
5.	Shambuka	Australian Snail	$CaCO_3$
6.	Mukta shukti	Pearl oyster Shell	$CaCO_3$
7.	Kaparda	Cowrine Shell	$CaCO_3$
8.	Kurmapristha	Turtle Shell	$CaCO_3$
9.	Samudraphena	Cuttle fish bone	$CaCO_3$
10.	Pravala	Coral	$CaCO_3$
11.	Mukta	Pearl	$CaCO_3$
12.	Mrigashringa	Deer Antlers	$Ca_3(PO_4)_2$
13.	Kukkutanda twak	Hen's Egg Shell	$CaCO_3$

Sikata Varga

Sikata varga are the group of drugs which are the compounds of Silicon. Classification of Sikata varga was not found in earlier Rasa texts, but the scattered informations of these drugs and their usage in Dhatuvedha, Parada bandhas and also therapeutic administration were mentioned. Authors of 20th century have grouped the drugs of Silicates under the name Sikatavarga. Sikatavargas mentioned for the first time in the text Rasamritam. This classification was done based on chemical composition as "silicon compounds".

Drugs which are included in Sikata varga, their common name and their chemical composition are as below:

S.No	Classical name	English name	Chemical composition/Formula
1	Sikata	Silica/Sand	SiO_2
2	Dugdhapashana	Talc	$H_2Mg_3(SiO_3)_4$ or $Mg_3Si_2O_{10}(OH)_2$
3	Nagapashana/ Jaharmohar	Serpentine	$Mg_3Si_2O_5(OH)_4$
4	Badarshama	Silicate of lime	Si_4CaO_4
5	Vyomashma	Sangeyashb-Jade	$Na(Al,Fe)Si_2O_6$
6	Kousheyashma	Asbestos	$Mg_3Si_2O_5(OH)_4$
7	Akika	Agate	SiO_2

Lavana Varga

Lavana varga includes the drugs which are salty in taste. These drugs are used in the shodhana and marana of metals and other drugs.

Pancha lavanas as per Rasa Tarangini are:-

सैन्यवञ्चाथ सामुद्रं बिडं सौवर्चलं तथा। रोमकञ्चेति विज्ञेयं बुधैर्लवणपञ्चकम्।। (R.T.2/3)

S.No	Classical name	English name	Chemical composition/ Formula
1	Saindhava Lavana	Rock Salt	Sodium chloride/ NaCl with traces of calcium, magnesium, potassium sulphate and other minerals
2	Sauvarchala Lavana	Sochal Salt/Black Salt	Sodium chloride/NaCl with traces of KCl, Na_2SO_4 and Carbonate
3	Vida Lavana	Ammonium chloride	Ammonium Chloride/NH_4Cl
4	Samudra Lavana	Sea Salt	Sodium chloride/NaCl
5	Audbhida Lavana	Sodium carbonate	Sodium Carbonate/Na_2CO_3

Visha and Upavisha

In Rasashastra, Vishas has got prime importance in the Rasa karma as well Rasa bhandha. They are included in Rasashastra as they are useful in Rasa karma. Visha and Upavisha dravyas are considered more valuable even from a therapeutic point of view in accordance with their quick effectiveness even in smaller doses. But at the same time are very dangerous as these may prove fatal to human beings if used without proper purification and not in recommended doses.

Sthavara visha is again divided into two types:

1. Mahavisha - Ex : Vatsanabha
2. Upavisha - Ex: Tinduka

In Rasa tarangini, Nine types of mahavishas are mentioned and quoted that

among them, Vatsanabha is considered as best for Parada karma as well as therapeutic purpose. Other 8 vishas are not much in use, so explanation regarding those Vishas are not done. There is a explaination of 11 types of upavisha.

विषतिन्दुकबीजं च त्वहिफेनञ्च रेचकम्। धत्तूरबीजं विजया गुञ्जा भल्लातकाह्वयः।।
अर्कक्षीरं स्नुहीक्षीरं लाङ्गली करवीरकम्। समाख्यातो गणोऽयं तु बुधैरुपविषाभिधः।। (R.T.24/163-164)

S.No	Classical name	Scientific name	Family
1	Vatsanabha	Aconitum ferox wall.	Ranunculaceae
2	Kuchala	Strychnous nux-vomica	Longaniaceae
3	Jayapala	Croton tiglium Linn.	Euphorbiaceae
4	Dhattura	Datura metel Linn.	Solanaceae
5	Bhanga	Cannabis sativa Linn.	Cannabaceae
6	Bhallataka	Semecarpus anacardium Linn.	Anacardiaceae
7	Gunja	*Abrus precatorious Linn.*	Fabaceae
8	Arka	*Calotropis procera/Calotropis gigantum*	Apocynaceae
9	Snuhi	*Euphorbia nerifolia*	Euphorbiaceae
10	Langali	*Gloriosa superba Linn.*	Colchicaceae
11	Karaveera	*Nerium odorum Soland.*	Apocynaceae
12	Ahiphena	*Papaver somniferum Linn.*	Papaveraceae
13	Chitrakmoola	*Plumbago zeylanica*	Plumbaginaceae

Kajjali

Kajjali is a Sagandha, Niragni parada yoga. The bandha involved in this preparation is Kajjali Bandha, where purified mercury and sulphur are intimately mixed in definite proportion, to get a black powder called Kajjali.

Definition

धातुभिर्गन्धकाद्यैश्च निर्द्रवैर्मर्दितो रसः सुश्लक्ष्णः कज्जलाभोऽसौ कज्जलीत्यभिधीयते।। (R.R.S.8/5)

निर्द्रवैर्धातुभिश्चाथ गन्धकादिभिः पेषितः पारदः श्लक्ष्णतां प्रापितः।।
कज्जलाभो यदा जायतेऽसौ तदा नामतः कोविदैः कज्जलीत्युच्यते।। (R.T.2/27)

Shuddha Parada is taken along with Shuddha Gandhaka alone or combined with other dhatus (metals) and minerals, mixed and triturated without adding any liquid till the mixture become slakshna (soft and smooth) and appears like kajal in its colour and consistency. This is called Kajjali.

Importance

सहपानानुपानानां वैशिष्ट्यादिह कज्जली। सर्वामयहरा वृष्या मता दोषत्रयापहा।। (R.T.6/112)

- Based on different sahapanas and anupanas, it can be used to cure all diseases.
- It is Tridosha hara and aphrodisiac.
- Among all Khalvi Rasayanas, Kajjali is having prime importance, as it forms base to many mercurial preparations.
- Kajjali is also good yogavahi, which enhances the actions of the drugs mixed with it and takes them to the target tissues. This makes the drugs to act with more efficacy in low dose and also increases their bio-availibility and shelf life.

Mitra Panchaka

आज्यं गुञ्जाश्च सौभाग्यं क्षौद्रं च पुरसंज्ञकम्। एतत्तु मिलितं विज्ञैर्मित्रपञ्चकमुच्यते।। (R.T. 2/37)

1. Aajya (Ghee)
2. Gunja (Abrus precatorius)
3. Soubhagya/Tankana (Borax)
4. Kshaudra (Honey)
5. Pura/Guggulu (Commiphora mukul)-these five drugs are termed as Mitrapanchaka

Importance

- These drugs are used in the liquefaction of metals.
- These drugs are also used in the Apunarbhava test of Bhasma pareeksha.

Dravaka Gana

गुञ्जा मधु गुडः सर्पिः सौभाग्यं गुग्गुलुस्तथा।पूर्वाचार्यैः कीर्तितोऽयं धातूनां द्रावको गणः।। (R.T.2/35)

1. Gunja (Abrus precatorius)
2. Madhu (Honey)
3. Guda (Jaggery)
4. Sarpi (Ghee)
5. Soubhagya/Tankana (Borax)
6. Guggulu (Commiphora mukul)

These drugs are grouped under Dravakagana.

Importance

These drugs reduces the melting point of the metals and acts as catalysts in the liquefaction of metals

Sandigdha (Controversial)

The word Sandigdha or controversy refers to the confusion or unauthenticated or unjustified versions of subjects. Some of the drugs mentioned in Rasashastra are still remains as controversial drugs. The controversies are regarding their origin, types, synonyms, different vernacular names, structure and therapeutical properties. These controversies need to be resolved, otherwise which it will harm the existence of drugs plained in text book. To preserve the treasure of science it is necessary to carry out

ientific validation process by considering some relative aspect of drugs which were und in those days by comparing with present available sources and technologies.

Few controversial drugs are :

Vaikranta

Vaikranta is the mineral drug included in the group of Maharasa and Uparatna. *aikranta* is controversial today because it is represented by different minerals, which re identified as fluorspar, feldspar, quartz, tourmaline etc.

Fluorspar, Tourmaline and quartz are three different minerals which are having more or less similar properties and physical appearance as of Vaikranta. The properties of these are:

Chemical Name	Tourmaline	Fluorspar	Quartz
Chemical composition	$Na(MgFeMnLiAL)_3\ Al_6\ (B_3O)_3\ (Si_6O_8)$	CaF_2 (Calcium Fluoride)	SiO_2
Varieties	1. Rubellit-Transparent, red and pink. 2. Indicolite- Indigo blue. 3. Brazilian sapphire- Tr. Berila blue. 4. Brazilian emerald- Tr. Green	pink to rose red. Brown to grey.	1. Rose quartz-pale 2. Milk quart-white. 3. Smoky quartz -
Varieties	5. Achroite - Colorless.		
Colour	Commonly black or bluish black. more rarely blue, pink, green and colourless.	Variable including colourless. White, green, purple, yellow or Blue.	Pure quartz is colorless or white; common colored varieties are rose quartz, smoky quartz, milky quartz, and others.
Luster	Vitreous	Vitreous	Vitreous/glossy
Crystal	Prismatic crystal Commonly	Cubic	Hexagonal
Structure	Three-sided, six-sided, or nine-sided, and striated vertically.	Common, rarely Octahedral or Tetrahedral.	6 sided prism ending in 6-sided pyramid

Cleavage	Prismatic, Rhombohedral, Trigonal.	Octahedral-perfect Cubic.	Indistinct Rhombohedral crystal system.
Specific Gravity	2.9-3.2	3-3.5	2.6 to 2.8 variable in impure varieties
Hardness	7-7.5	4	9
Fracture	Subconchoidal to uneven	Subconchoidal to uneven	Conchoidal
Streak	White	White	White

To overcome this controversy, research work was undertaken entitled as "Standardization of Vaikranta bhasma, in relation to its identification, experimental studies and clinical observations" and the outcome of the work inferred that-

By taking into account all the properties described in classical texts and using information from geology, gemology and mineralogy, it is proved that tourmaline is the only mineral, which should be used as *vaikrānta*. Black tourmaline (iron tourmaline or schorl) should be taken for therapeutic purpose and placed under *Mahārasa* group while other varieties of tourmaline should be used for astrology and placed in *Upratna* group.

By considering the above reference, physico- chemical study of vaikranta bhasma has been done by taking Tourmaline as Vaikranta (Tripathi R, Rathore AS, Mehra BL, Raghubir R. Physico-chemical study of Vaikrānta bhasma. Anc Sci Life. 2013 Apr; 32(4) : 199-204.)

In the single drug monographs published in API, Vaikranta is considered as Tourmaline. So Vaikranta can be considered as Tourmaline.

2. Chapala

Chapala is the drug mentioned in the group of maharasa, considered as controversy because of lack of identification and scarcity of drug. There are different opinions regarding the mineralogical identification of Chapala. According to Sri D.A.Kulkarni, commentator of Rasa Ratna Samuchchaya, Chapala is a Bismuth. Few scholars opines it as Selenium. As maharasa group contains the drugs which are in the form of mineral or ore of metal, Some says it as Cassiterite, ore of Tin. The common factors in these minerals are as follows:

S.N.	Properties	Chapala	Selenium	Bismuth	Cassiterite
1	Melting point	Vangavat	221°C	271.5°C	2320 C
2	Crystal system	Shadasra	Hexagonal	Rhombohedral	Tetragonal

3	Occurrence	Makshika bhoomyod bhava	Usually found in conjunction with Copper and Sulphur (copper pyrite)	Often associated with Lead, Zinc, Copper, Tin and Silver ores from which it is obtained as a byproduct during refining	Found mainly in acid igneous rocks with Tourmaline, Topaz Arseno-pyrite bearing minerals in high temp-erature
4	Specificgravity	Guru	4.8	9.8	6.4-7.1
5	Hardness	Snigdha (Smooth)	2	2-2.5	6-7
6	Luster/ Trans-parency	Sphatika Chaya	Metallic/opaque	Metallic/ opaque	Adamantine or greasy/ generally opaque but is translucent in thin crystals.
7	Colour	Goura Shweta Aruna Krshna	Ores are Green, Bluish grey, Bronzy grey, Tin white, Grey Brown, Dark grey, Blue, White, Steel grey, lead grey, Reddish brown, Black	Grayish white metal with a reddish tinge. ores are Red, black and gold-en yellow	Brown, Black, Red-dish brown, Brownish black
8	Therapeutic use	Lekhana Ativrshya Deha lohakara	Antioxidant, Immuno booster, help in the de-velopment and maintenance of healthy Sperm cells, reduces the risk of Skin and Prostate cancer.	G.I. Disorders as Soothing and Demulcent Agent.	

9	Dhatu vada	Rasa bandakara	Selenium occurs with Mercury, in compound form as its ores: Halcite and Tiemannite It binds Mercury firmly	Not binds mercury	Not binds mercury

By comparing the above factors, Cassiterite does not match with the properties of Chapala and hence this cannot be considered as Chapala. Although studies done on the physical properties of Chapala says that Bismuth match more with the acceptable characteristics of Chapala as described in Ayurvedic classics with metallic luster, high specific gravity and low melting point (Prem Shankar Pandey, Identification of Chapala: A Mineral Drug of Ayurveda, IJAHM, 10:1 (2020) 3705-3708), but bismuth is mainly used in digestive disorders. Metal selenium has many amorphous forms, its particles have hexagonal structure, found admixture with Chalcopyrite, it is mainly used in sexual disorder and also as best anti-oxidant. So Chapala can be better considered as a Selenium.

3. Rasanjana

Rasanjana is one of the type of Anjana, which is mentioned in the group of Uparasa. Since ancient times Rasanjana is considered to be a controversial drug.

Different Opinions About Rasanjana

1) Rasaagraja, Rasodbhava, Rasagarbha are mentioned as synonyms of Rasanjana suggesting that rasanjana is related to parada.
2) Prof. D.A. Kulakarni, in his commentary on R.R.S. says Rasanjana is Yellow Oxide of Mercury.
3) The Kitta which is obtained after doing Dhamana of reeti (pittala) is also called rasanjana. In its non availability, Daruharidra Rasakriya can be taken.
4) Yadavji opines that Rasashastra include many herbal drugs and Rasanjana is indicated orally and externally by Charaka which might be the Darvi kwatha bhava and never the Yellow oxide of Mercury.
5) Rasa classics have mentioned 2 types of Rasanjana (R.J.N. dwitiya khanda chap. 2, page 203).
   i) Shailaja : Obtained naturally from mountains.
   ii) Kritrima : prepared out of peeta chandana kwatha or Niryasa or Darvi kwatha.

Considering the above factors, it can be inferred that, among two types of Rasanjana, shailaja variety is that which is obtained from hills or mines hence it must be a mineral

and on this basis prof. D.A. Kulkarni had mentioned that Rasanjana is yellow oxide of mercury. But present day vaidyas are using the kritrima variety of rasanjana, which is prepared by rasakriya of darvikwatha and Ajadugdha. It is also used in netra rogas since ancient times.

4. Pushpanjana

Pushpanjana is one of the type of Anjana, which is mentioned in the group of Uparasa. Different opinions about Pushpanjana:

1. According to Ayurveda prakasha, Pushpanjana is white in colour and the author says, some opines it as Ritikitta. Riti is Pittala (Brass), an alloy of Copper and Zinc. Its kitta may be obtained by frying it.
2. Dr. D. A. Kulkarni, commentator of Rasaratna samucchaya says that, as derived from the name, it may be anjana formed from the flower. It may be the nectar of the flower seen in the region of Kashmir, which is called as Kashmiri madhu, which is used as Anjana.
3. In Atreya samhita, there is a reference of Padma madhu which is nothing but the nectar derived from lotus, which possess the property of curing netra rogas. This can also be considered as Pushpanjana.
4. Some opines that, Sphatika when roasted becomes shuddha and attains the laja form. This roasted sphatika can be considered as Pushpanjana, as it is white in colour and used for treating eye diseases.
5. Pushpa kasisa can also be considered as Pushpanjana as it is having the synonyms of Nayanoushadha or netroushadha, signifying its usage in netra rogas.
6. Dr. Siddhinandan Mishra, in his Ayurvediya Rasashastra, narrates that when Zinc is roasted in open air, it turns to laja swaroopa, which can be considered as pushpanjana.

Research works to clear the controversies of Pushpanjana are not available till now. Based on the literature available, it can be inferred that Pushpanjana could be the drug which is chemically Zinc oxide. It is having a synonym as Reetija, Riti is the Pittala (Brass), an alloy of Copper and Zinc, suggesting that it might be a Zinc compound. Based on its appearance, it might have been named as pushpa, so directly any flower or its nector cannot be taken as Pushpanjana. Pushpanjana available in Market is usually prepared in laboratories which is chemically Zinc oxide (ZnO). Yadavji and some other Acharyas has accepted the same. So Pushpanjana can be taken as a drug which is chemically ZnO.

5. Vahnijara

Vahnijara or Agnijara is the drug mentioned in Uparasa varga. For the first time

Rasaranva mentioned about Agnijara in his text. There are different opinions about Agnijara:

1. According to R.R.S. and Raja Nighantu,

   समुद्रेणाग्निनक्रस्य जरायुर्बहिरुज्झितः। संशुष्को भानुतापेन सोऽग्निजार इति स्मृताः।। (R.R.S. 3/135)

   Agnijara is the jarayu of a marine species Agninakra (a sea animal), which dries up by sun and thrown to the shore.

2. According to A.P.,

   आब्धितीरेऽग्निनक्रस्यजरायुः शुष्कतांगतः। अग्निजरास्तुसप्रोक्तःस क्षारोजारहितः ।। (A.P. 2/341)

   Agnijara is the dried placenta of the Agninakra(a sea animal) which can be found at the sea shore. It is alkaline in nature and good for the Jarana purpose.

3. According to Vaidya shabda sindhu, Agnijara is a type of tree, found near western sea shore which is used as medicine.
4. According to Rasamrita, it is intestinal stone of whale shark. Due to this, shark dies & stone comes out in sea water and dries up by rays
5. Some says, it is the sushka mala of whale fish, which is collected after its death. Fish dies of Malabaddhata and after sometimes, its intestinal part get separated from the fish. This floats and reaches the shore as a solid mass or fisherman collects it. Initially, it does not possess any smell but later after drying, it develops and starts emitting tikshnagandha. It is krishna pandura in colour, light, not soluble in water, inflammable and volatile.
6. According to Shri Damodar Joshi, its color is blackish white just like an ash, having the black spots over its surface. It is opaque, very light in weight, insoluble in water, and very pungent. It resembles musk (kasturi). It burns in fire with no residue by complete volatalization.

Based on the description available in the classical literature and opinion of the scholars, Vahnijara/Agnijara can be considered as an Ambergris, which is a biliary secretion of intestine of sperm whale. It contains Amber which is aromatic in nature and used in manufacture of Perfumes and other aromatic products. It is found in abdomen of whale, which is solid, waxy, flammable substance, dull grey/black colour produced in digestive system.

6. Girisindura

Girisindura is one of the rasa dravya mentioned in the group of Sadharana rasa.

1. According to Rasa ratna samucchaya, Girisindura is red colored dry mercury powder, found in small quantities inside the rocks in very high mountains.
2. It is red coloured exudates coming out of the rocks of big mountain & dried with sunrays, so the adjective Giri might have added to its name.

3. According to D A kulkarni, it is a compound of Hg & oxygen and is rarely found in rocks along with other minerals.
4. According to Dr. Vaman Ganesh Desai, it is Rakta Bhasma, a type of parada Bhasma (mercuric oxide) which is prepared by Urdhwapatana kriya called as Calcined mercury.
5. But Rasataranginikara clearly mentioned Girisindura as a lead oxide and addition to it, the synonyms like Nagaja, Nagagarbhaja etc., signifies that it is originated from Naga.
6. But many authors called it as a red oxide of mercury and its description closely resembles to Montroydite, a mineral of mercury oxide.

The controversy of Girisindoora lies whether it is ancompound of Mercury or Lead. Its synonym includes relating to both the compounds as Rasagarbhaja and Nagagarbhaja. According to R.J.N., Sindura is of 2 types:

1. Girisindura- Occurs naturally in mountains, bright red in colour, lustourous, contains Mercury and Oxygen.
2. Nagasindura- Artificially prepared, light red in colour, non-lustourous, contains Lead and Oxygen.

So this clears the controversy that Girisindoora is a compound of mercury and oxygen. As it was a rare mineral, it was artificially prepared using the lead and called as Nagasindoora. Girisindoora which is available naturally is red oxide of Mercury and it posses the qualities like Tridoshashamka, Netra rogahara and helps to attain Dehasiddhi and Lohasiddhi. In the name of sindoora what available in market is prepared by lead compound is not having the same quality of Girindoora. So it is used only for external application.

7. Kankushtha

Kankushtha is the one among the drugs mentioned in Uparasa. It is a controversial drug since ancient times. There are different references in Ayurveda granthas referring to different substances under the name Kankushta.

In Rasa Ratna Samuchhaya, different opinions of ancient scholars are mentioned

1) केचिद्वदन्ति कङ्कुष्ठं सद्योजातस्य दन्तिनः। वर्चश्च श्यामपीताभं रेचनं परिकथ्यते।। (R.R.S.3/111)

Some says Kankushta as meconium of newly born Elephant. It is blackish yellow in colour and a strong purgative.

2) कतिचित्तेजिवाहानां नालं कङ्कुष्ठसंज्ञकम्। वदन्ति श्वेतपीताभं तदतीव विरेचनम्।। (R.R.S.3/112)

According to some scholars, Kankushta is the umbilical cord of newly born horse. It is whitish yellow in colour and strong purgative.

3) Acharya Sushrutha has categorised Kankushta under Rechaka dravya (purgative herbs), which denotes it as a plant according to Sushrutha.

4) According to Acharya Dalhana, Kankushta is the Swarnaksheeri (Argemone maxicana) or niryasa of Swarnaksheeri, which says it is an herb.

5) Acharya Dalhana also says kankushta as Revandchini (Rheum emodi) i.e. Pitamula, which also signifies it as an herb.

6) According to some scholars, Kankushta is Mriddarashringa (Litharge). It is yellow in colour and Guru in nature.

7) कङ्कुष्ठ विद्रुमच्छायतच्छत्वमयं प्रिये। (Rasarnava)

According to Rasarnava and Ayurveda prakasha, Kankushta is red in colour like pravala (coral).

8) According to Acharya Bhaluki, Kankushta is a ore of Vanga.

9) According to R. R. S., Kankusta is found in the vicinity of some peaks of the Himalayan foothills called Shivalliks. He mentions 2 types of Kankushta as Nalika (tubular) and other in powder form as Renuka.

10) So few scholars says, it is a "Magnesite" ($MgCO_3$) which is available in the Himalayan foot hill of Shivaliks. It is yellow in colour and possesses the property of laxative.

11) According to Yadvji Trikamaji Acharya, Kankushta is Ghanasatwa of root of Revandchini tree.

12) D. A. kulkarni opines Kankushtha as a resin obtained from the Mysore gambose tree. It is yellow in colour and a strong purgative.

Discussion on Different Opinions

All authors claim the property of kankusta as purgative in nature.

- Though it is said that the meconium of a newly born horse and elephant and umbilical cord of a newly born horse, both have a purgative property, it is not in practice to use these substances as a purgative and also not proved. So these two substances cannot be called as Kankustha.
- According to Dalhana, root of Swarnakshiri is considered as Kankustha, but the latex of this plant is purgative and not the root. Also the latex is white in colour, but kankushtha has told to beas yellow colour. Thus it cannot be called as Kankustha.
- Mriddarashringa is categorized under Sadharana rasa and so it cannot be Kankustha.
- Vidruma (Coral) and ore of Vanga do not possess rechaka properties.
- Magnesite is laxative, but not purgative.

- Though Revandachini moola is purgative, it does not match with the other properties attributed to Kankushtha.
- The resin collected from the bark of Mysore Gambos tree (Garcinia morella) gets a rod like shape (Nalika) and when resin is in liquid state, it contains yellowish black flacks (Renuka). Hence this resin consists of both the forms i.e. Nalika and Renuka as mentioned in the texts. Moreover it is strong purgative thus it can be suitably called as Kankustha. Based on the appearance, physical properties, varieties and actions it can be concluded that the resin collected from the bark of Mysore gambose tree (Garcinia morella) is Kankustha. Also, according to standard nomenclature of Ayurvedic medicinal plants CCRA and S, New Delhi 1999, Garicinia morella is to be taken for Kankustha.

Anupalabdha (Not Available)

Some of the drugs that are explained by RasAcharyas regarding their properties and grahyagrahya laxanas cannot be assessed in present mineral drugs. It is because of non-availability or scarcity of native forms of mineral or ore-mineral. Some of them are:

1. Rasaka

In present day, Rasaka, which is the ore mineral of Yashada is out of use. It is because of difficulty in selection of genuine drug. In classics Acharyas mentioned 3 varieties of Rasaka. But in present day it is very difficult to compare the available sources with the verses of Acharya.

Now a days often Processed Yashada is used in place of processed Rasaka which is also recommended by AFI[Ayurvedic formulary of India. Ministry of Health and Family Welfare Government of India, Department of AYUSH, New Delhi. Part I, Rasayoga, 20/36; 708-709]. But difference of opinion regarding mineral varieties i.e., varieties of Rasaka or their substitutes commonly assumed or used in present days are dissimilar as compared with Yashada.

2. Sauviranjana

Sauviranjana is said to be obtained from the mountains of Sauvira, a country along the Indus, hence it derives its name. Its vernacular name surma is the sulphide of lead ore. Surma is usually translated as sulphide of antimony, but it hasnot been able to obtain a specimen of the antimonial ore from the shops. The sulphide of antimony occurs in fine streaky, fibrous, crystalline masses of a radiated texture. The lead ore on the contrary, occurs in cubic masses destitute of rays and is tabular in its crystalline arrangement.(Source: Alois Payer- Amarakosha: Vaishyavarga 100-106b)

In the single drug monographs published in API, Sauviranjana is considered as

Lead ore. But due to its ambiguity, still it cannot be assessed exactly to the present available minerals

CHAPTER TWO

Krutrima (Artificial)

Since ancient times, few drugs are rare in Occurrence and few were non available. So artificial preparation of such mineral drugs are explained in the classics to combat their scarcity. These artificially prepared drugs are equally potent and can be used in place of natural one. Artificial preparation of following drugs are explained in rasa Tarangini-

1. Sasyaka

विशुद्धे ताम्रचूर्णे तु गन्धकाम्लं शनैः क्षिपेत्। विज्ञाय विद्रुतं ताम्रं शोषयेन्मृदुवह्निना।।
विमर्द्यात्युष्णनीरेऽल्पे द्रवीकुर्याद्विधानवित्। जले शीतत्वमापन्ने कणत्वं समुपागतम्।।
शिखिकण्ठसमच्छायं तुत्थकं तु समाहरेत्। इत्थं विनिर्मितं तुत्थं वीतशङ्कः प्रयोजयेत्।। (R.T. 21/145-147)

Shuddha Tamra churna is taken in a clean glass bowl and slowly added Sulphuric acid little by little till the Tamra churna get completely dissolved in it. After Tamra churna get completely dissolved, the bowl is placed over the fire and heated in mandagni till the liquid portion get evaporated. Then, this dried powder is triturated with little amount of very hot waterto make it a solution. This solution is placed in the bowl till it becomes cool and get crystalized. After cooling of water, Tuttha having the colour of that of Peacock's neck can be procured. This artificially prepared Tuttha can be used without any doubt.

2. Gandhaka

Sulfur can be prepared artificially through industrial processes. One of the most common methods for the industrial production of sulfur is the Claus process. The Claus process is widely used to extract sulfur from hydrogen sulfide (H_2S) gas, which is often found in natural gas and petroleum processing.

Materials and Equipment

1. Hydrogen sulfide (H_2S)-containing gas source (e.g., natural gas or petroleum)
2. Air or oxygen source
3. Catalytic reactor or furnace
4. Condenser
5. Sulfur collection and storage system

Procedure

1. The Claus process starts with a source of hydrogen sulfide (H_2S). This can be obtained from various industrial processes, such as natural gas processing, oil refining, or other chemical processes that produce H_2S-rich streams.

2. **Oxidation:** The H_2S-containing gas is mixed with air or oxygen in the right proportions to promote oxidation. The reaction is as follows:

   $2H_2S + 3O_2 \rightarrow 2SO_2 + 2H_2O$

   This reaction converts hydrogen sulfide (H_2S) into sulfur dioxide (SO_2).

3. **Catalytic Reaction:** The sulfur dioxide (SO_2) produced in the oxidation step is then passed through a catalytic reactor or furnace. In this reactor, sulfur dioxide reacts with more hydrogen sulfide (H_2S) in the presence of a suitable catalyst. The reaction is as follows:

   $2H_2S + SO_2 \rightarrow 3S + 2H_2O$

   This reaction produces elemental sulfur (S) and water (H_2O).

4. **Condensation:** The mixture of sulfur vapor and water vapor is then passed through a condenser. In the condenser, the vapor is cooled, causing the sulfur to condense and form liquid sulfur. The water vapor is typically separated and removed at this stage.

5. **Sulfur Collection:** The liquid sulfur collected in the condenser is then drained into storage tanks. The sulfur is typically in the form of a molten liquid.

6. Solidification: The collected liquid sulfur is allowed to cool and solidify in storage tanks. It solidifies into a yellow crystalline solid.

7. **Purification:** Depending on the desired purity of the sulfur, additional purification steps may be required, such as filtration or distillation.

The Claus process is an efficient and widely used method for the large-scale production of elemental sulfur from hydrogen sulfide-containing gases. It plays a crucial role in the sulfur industry, ensuring a steady supply of sulfur for various industrial processes.

3. Kasisa

विशुद्धं लोहचूर्णन्तु काचपात्रे निधापयेत्। सजलं गन्धकद्रावं शनैस्तस्मिन् विनिक्षिपेत्।।
तावन्तं द्रावकं दद्याद्यावता द्रुतिमाप्नुयात्। क्षणेनैवोष्णतां याति फेनञ्चोत्तिष्ठते परम्।।
ततः सारकपत्रेण सारयेद् रसकोविदः। मलं सारकपत्रस्थं हित्वा द्रवमिहाहरेत्।।
द्रवोन्मितां क्षिपेत्तीव्रां निर्जलां विमलां सुराम्। सुरानिक्षेपणाद् याति कासीसं तु तलस्थताम्।।
ततो द्रवमिमं हित्वा चूर्णं घर्मे निधापयेत्। भानुभानुविशुष्कन्तु कासीसं जायतेऽमलम्।।
द्विभागिकन्तु कासीसं सलिले तु त्रिभागिके। निक्षिप्यं द्रवतां यातीत्याहू रसविशारदाः।। (R.T. 21/234-239)

Shuddha Loha churna is taken in a clean glass bowl and slowly added dilute Sulphuric acid little by little till the Loha churna get completely dissolved in it. When sulhuric acid is added, loha churna immediately becomes hot and can observe the appearance of foam. After foam get subsided, dissolved loha churna is filtered through the Saraka patra(filter paper). Impurities will collect over the filter paper, this wll be

discarded and only the liquid part is collected. Then equal quantity of pure absolute alcohol is added to the collected liquid. By adding absolute alcohol, Kasisa get settled at the bottom of the glass bowl. The supernated liquid in the bowl is taken off to the other vessel and the kasisa settled down is collected and dried in the sun. This kasisa which is dried in the sunrays becomes pure. This prepared Kasisa dissolves in twice or thrice the amount of water.

4. Rasanjana

दार्वीक्वाथमजाक्षीरपादपक्वं यदा घनम्। तदा रसाञ्जनं ख्यातं नेत्रयोः परमं हितम्।। (A.P.2/234)

The kashaya of Daruharidra is prepared by boiling 1 part of qwatha churna of stem of Daruharidra with 16 times of water and reducing it to ¼th. After filtering, the equal quantity of Aja ksheera is added to the qwatha and boiled again till it becomes thicker in consistency. This is the method of preparation of Daruharidra rasakriya or rasanjana which is good for eyes.

5. Hingula

वसुभागमितं गन्धं सूतं नेत्रयुगोन्मितम्। मृदङ्गयन्त्रे संस्थाप्य वारंगं भ्रामयेत्ततः।।
तस्य सम्भ्रमणादेव श्लक्ष्णचूर्णं प्रजायते। व्यावर्तनपिधानञ्च सम्भ्राम्य ह्यवतारयेत्।।
चूर्णं धूसरवर्णाभं यंत्रान्निष्कासयेत्ततः। सुदृढायां ततः स्थाल्यां चूर्णमेतन्निधापयेत्।।
रेखान्वितमुखी स्थाली बुधैरत्र प्रशस्यते। व्यावर्तनमुखीमन्यां स्थालीं तस्यां निधापयेत्।।
स्थालीं सम्भ्राम्य परितो यत्नेन रोधयेन्मुखम्। ततः संस्थापयेच्चुल्ल्यं वह्निं दद्याच्छनैः शनैः।।
अधःस्थालीकण्ठसंस्थं हिंगुलं तु समाहरेत्। ऊर्ध्वस्थालीतलस्थञ्च पुनः पक्त्वा समाहरेत्।। (R.T. 9/5-10)

8 parts of Gandhaka and 42 parts of Parada is taken in mrudanga yantra and rotated its handle. This rotation exerts pressure over Parada and Gandhaka which results in the formation of smooth and shining powder. Then the lid of the yantra is opened and gray colour powder is removed from the yantra. This powder is placed in a vessel which is having round lines at its mouth and over this vessel another same sized vessel having round lines at its mouth is placed. Mouth part of both the vessel is sealed and dried. This whole apparatus is kept over the stove and heated in very mild agni. After heating for specified time, it is allowed for self cooling and seal between 2 vessels is opened. Hingula adhered at the neck part of the lower pot is collected and that is found in the bottom of the upper pot is recovered, again subjected to heat in the same way to make the rough Hingula into soft powder. At the end, soft, smooth and shinning Hingula is collected and preserved.

Pratinidhi (Substitute)

Substitution is a replacement of equivalent drugs in place of original drugs on the basis of similar pharmacological actions and therapeutic uses. There are several reasons for substitution, but in Rasashastra the main reason is the cost effectiveness. Some drugs like Vajra, Swarna are more costly, so they are substituted by less expensive drugs like

Vaikranta, Swarna makshika respectively. But research has not been done in this area to identify and confirm whether the efficacy of substitute and original drug remains the same. The description available in the classics can be used to compare and justify the concept of substitution.

1. Vajrabhave Vaikranta

Vajra is one among of the precious stones. All precious stones are costly because of their luster and other physical properties. Rarity is another characteristic that lends value to a gemstone. Among all the ratnas, Vajra is most costliest due to its luster and hardness. The common man cannot afford for its preparations. So our Acharyas mentioned the use of Vaikranta in the place of Vajra for those who cannot afford it.

The definition of vaikranta suggests that its therapeutic property resembles that of vajra, supporting the fact of using Vaikranta as a substitute of Vajra. Rasa taranginikara has defined Vaikranta as

वज्रवत् सर्वरोगाणां हरणाय यतस्त्विदम्। धत्ते विक्रान्तिमतुलां वैक्रान्तं कथ्यते ततः।। (R.T. 23/156)

Vaikranta is the drug which cures all diseases like Vajra when used judiciously. That which gives uncomparable power is called as Vaikranta.

"विकृन्तयति लोहानि तेन वैक्रान्तकः स्मृतः"।

The etymology of the word Vaikranta says that which deforms all kinds of metallic substances, or it has the power to cut all kinds of metallic substances due to its hardness and its judicious administration in appropriate dosage can kill (cure) all types of diseases of body. This property resembles the properties of Vajra.

While explaining the therapeutic properties of Vaikranta, the author of Rasa ratna samuchchaya has narrated as it is same as Vajra-

वैक्रान्तो वज्रसदृशो देहलोहकारो मतः। विषघ्नो रसराजश्च ज्वरकुष्ठक्षयप्रणुत्।। (R.R.S. 2/57)

Vaikranta can bestove both Dehasiddhi and Lohasiddhi, like Vajra. It cures Visha, Jwara, Kushta, Yakshma and it excels all the minerals.

Even during the explanation of its processing like shodhana and Marana, there is a mentioning of adopting the procedure same as that of Vajra and also mentioned to use Vaikrant Bhasma in the place of Vajra Bhasma-

वैक्रान्तो वज्रवच्छोध्यो ध्मातः सिक्तोऽश्वमूत्रके। वज्रवन्मृतिमापन्नो वज्रस्थाने प्रयोजयेत्।।१६९।। (A.P. 5/169)

Vaikranta shodhana is done similar to that of Vajra by intense heating and sprinkling Ashwa mootra on it. The process of bhasmikarana of Vaikranta is also same as that of Vajra and this vaikranta Bhasma can be therapeutically used instead of vajra Bhasma.

रसायनेषु सर्वेषु पूर्वगण्यः प्रतापवान्। वज्रस्थाने नियोक्तव्यो वैक्रान्तः सर्वदोषहा। (R.R.S. 2/56)

The Vaikranta is best among all the rejuvenators and can be used in place of Vajra.

Properties of Vaikranta and Vajra

Properties	Vaikranta	Vajra
Rasa	Shadrasa	Shadrasa
Guna	Guru	Snigdha
Veerya	Sheeta	-
Vipaka	Madhura	-
Doshaghnata	Tridoshaghna	Tridoshaghna
Karma	Ayuprada, Balavarnakara, Ativrishya, Diptagnikara, Lohakari, Rasayana, Pranaprada, Yogavahi, Rasabandhakara, Dehadardyakara, Vishaghna, Rasaraja	Ayuprada, Parama hrudya, Yogavahi, Pradipana, Vayasthambaka, Kantijanana, Saukhya, Rasayana, Balaprada, Netrya, Medhya, Rogaghna, Mrutyuharana, Sarvasiddhaprada, Rasabandhakara, Rasamaraka

By observing the opinions and descriptions of rasa Acharyas, and also by analysing the properties of both the drugs, it can be inferred that as the qualities and therapeutic property of Vaikranta is almost same as that of vajra, it can be used as a substitute of Vajra bhasma.

2. Suvarna-Suvarna Makshika

Swarna (Gold) is a noble and costly metal that has the enormous therapeutic properties to the mankind. The substitute for swarna is said as Swarnamakshika (Chalcopyrite). The substitutes are chosen in such a way that they provide the desired benefit without disturbing the finished product's efficacy.

The author of Ayurveda Prakasha clearly describes the reason for considering the swarnamakshika as a substitute for Swarna.

ताप्यं माक्षिकधातुश्च माक्षिकं चैव तन्मतम्।। किंचित्सुवर्णसाहित्यात्स्वर्णमाक्षिकमीरितम्। (A.P. 4/2)

Some part of gold is present in it and hence it has named as Swarnamakshika. As it is the upadhatu of Swarna, gunas of swarna are present in it.

Rasa taranginikara also have the same opinion and states that–

ईषद्रौप्यस्य साहित्याद् रौप्यगुणसाम्यतः।। (R.T. 21/2)

Little amount of Swarna is present in Swarnamakshika, so its quality have the resemblance with that of Swarna.

Though we can find the references in classics for the presence of Swarna in swarnamakshika, practically if analysed, it is not having the presence of Gold. Chemical composition of Swarnamakshika are Iron, Sulphur and traces of Copper. But still

Swarnamakshika is not having less quality like Iron. When converted into Bhasma form, this will become laghu and may attain the higher qualities like Swarna. Therefore Swarnamakshika Bhasma is used instead of Swarna Bhasma for the nourishment of the body and to strengthen the nervous system.

The author of Ayurveda prakasha further says that-

न केवलं स्वर्णगुणा वर्तन्ते स्वर्णमाक्षिके। द्रव्यान्तरस्य संसर्गात्सन्त्यन्येऽपि गुणा यतः।।
किन्तु तस्यानुकल्पत्वात्किञ्चिदूना गुणास्ततः। तथाऽपि काञ्चनाभावे दीयते स्वर्णमाक्षिकम्।। (A.P. 4/3-4)

Swarnamakshikais not only having the properties of swarna but also the properties of the other drugs. To summarise, as swarna is present in swarnamakshika and as it has properties like swarna it can be taken as a substitute for gold.

Properties of Swarnamakshika and Swarna

Properties	Swarnamakshika	Swarna
Rasa	Kashaya, Tikta, Madhura	Kashaya, Tikta, Madhura,
Guna	Sheeta, Laghu, Rooksha	Sheeta, Guru, Snigdha, Picchila
Veerya	Sheeta	Sheeta
Vipaka	Katu	Madhura
Doshaghnata	Tridoshaghna	Tridoshaghna
Karma	Balya, Rasayana, Swarya, Chakshusya, Yogavahi, Sakalamayaghna, Vrishya	Balya, Rasayana, Sakalamayaghna, Vrishya, Medhya, Vishagna, Hridyam, Netryam, Kanthikara, Ayushyam, Pushtikara, Vayastha-pana, Yogavahi

By comparing the Properties of Swarnamakshika and Swarna and considering the reference in the classics, it can be inferred that Swarnamakshika bhasma can be used as a substitute of Swarna bhasma.

Prakriya Paribhasha

A) Shodhana

उद्दिष्टैरौषधैः सार्द्धं क्रियते पेषणादिकम्। मलविच्छित्तये यत्तु शोधनं तदिहोच्यते।। (R. T. 2/52)

The pharmaceutical process in which different dravyas are subjected to peshana (grinding) and other pharmaceutical procedures after mixing them with specified other drugs in order to remove unwanted properties or Mala (toxins) is called Shodhana.

Types of Shodhana

Shodhana is classified into two, as Samanya Shodhana, in which common method is used for group of drugs and vishesha shodhana, which is a specific method used for particular drugs by using specific drugs.

Samanya Shodhana- Prescribed commonly for a group of dravya or mineral aimed to eradicate general impurities along with enhancement of general properties.

Vishesha Shodhana- Specifically indicated for individual dravya aimed to eliminat specific unwanted property and to promote specific therapeutic property and also t prepare drug for next pharmaceutical procedures.

Importance of Shodhana

- Elimination of physical and chemical impurities, which are not desired
- Removal or minimization of toxicity of the material
- Transformation/Changing of the hard material in to soft and brittle.
- Induction/addition of desired qualities i.e. Gunavardhana
- Potentiating the therapeutic efficacy of the drug material to make it fit for internal use
- Induction of brittleness in the drug and conversion of the material to suitable form for further processing like Marana
- Leads to unique and suitable physio-chemical changes by reducing particle size, initiating oxidation process etc., to makes the substances suitable for further processing.
- Impregnation of sendriya (organic) qualities in to the drug material and make heterogeneous material into homogeneous.

Different techniques used for shodhana

Swedana

Literal meaning of Swedana is Perspiring, Softening, fomenting. Swedana is the process in which the drug is boiled in liquid media in Dola yantra. It is the procedure of boiling under liquid bath. The material is boiled in prescribed liquid through Dola Yantra method e.g- Shodhana of Sudha Varga Dravyas. Here boiling of raw material is done in certain juices, cow's milk, cow's urine etc.

Importance

- Increases the brittleness of minerals and metals
- Reduces the toxicity of some poisonous herbs, metals and minerals
- Neutralizes the undesirable properties of the drug like excessive amlatva, ksharatva gunas
- Infusion of therapeutically efficacious properties in metals and minerals.

Mardana

Mardana is a process of grinding where the material is ground properly without or with prescribed liquid for specific period e.g.- Parada. It is the process of trituration

of drugs to a fine state of division in the Khalwa yantra. Rasa Vagbhata has described Mardana under Parada samskara as Processing parada with the indicated aushadhi dravyas along with various amla dravyas mixed with Kanji through the Peshana karma i.e. trituration process is termed as Mardana. In this technique trituration of raw material with some herbal juices, decoctions, cow's milk. etc. is done for specific purpose.

Importance

- Mardana enhances the properties of Dravyas.
- Detoxification of some toxic drugs
- Disintegration of raw material to make it suitable for the processing like of marana of metals and minerals.
- Reduces the particle size of the drug and hence increases the bio availability.

Dhalana

संद्रावितस्य द्रव्यस्य द्रवे निक्षेपणन्तु यत्। ढालनं तत्समुद्दिष्टं रसकर्मविशारदैः।। (R.T.2/36)
द्रुतद्रव्यस्य निक्षेपो द्रवे तद् ढालनं मतम।। (R.R.S.8/43)

The pharmaceutical procedure of pouring the molten substances into another liquids is called by the name Dhalana by the experts of Rasa shastra.

Importance

- This procedure is used in the shodhana of the Rasa dravyas which are having low melting point like Gandhaka, Naga, Vanga and others.
- By the process of melting of raw material and pouring in some herbal juice/lime, they partially gets converted in to some compound form and brittleness of raw material increases.
- The process neutralises the toxic character of raw material due to variable pH of liquids in which melted raw material is poured.

Nirvapa

धात्वादेर्वह्नितप्तस्य जलादौ यन्निषेचनम्। स निर्वापः स्मृतश्चापि निषेकः स्नपनञ्च तत्।। (R. T.2/40)
तप्तस्याप्सु विनिक्षेपो निर्वापः स्नपनं च तत्। (R.R.S.8/56-57)

When the metals are heated to red hot and immersed in water or other liquids, then that pharmaceutical procedure is known as Nirvapa. It is also called as Snapana or nisheka.

Importance

- This procedure is used in the shodhana of many Rasa dravyas like Abhraka, Swarna makshika, Rajata, Tamra and others.
- The process neutralises the toxic character of raw material due to variable pH of liquids in which red hot material is quenched.

- This technique of shodhana remarkably increases the brittleness of metals ... minerals and prepares the drug for further processing like marana.

Nirjaleekarana

Nirjaleekarana is the method of shodhana where evaporation of water takes pl... Whole water content of the material is evaporated by heating e.g – Sphatika shodh...

Importance:

- This procedure is used in the shodhana of many Rasa dravyas like Tank... Sphatika and others.
- Desired chemical compound is formed like crystalline to amorphous form.
- Removes the unwanted property present in the form of water like kledata.

Nimajjana

Nimajjana is the method of shodhana which includes the process of dipping ... material is kept immersed in the prescribed liquid for specific period e.g – Vatsana... shodhana using Gomutra.

Importance

- This procedure is used in the shodhana of Vatsanabha and others.
- Soluble impurities will be removed.
- Counteracts the undesired properties in the drug and imbibes the good qual... of the drava used for dipping.

Bhavana

शुष्कचूर्णितस्य द्रावदेर्द्रवैः सम्येष्य शोषणम्। भावनं तन्मतं विज्ञैर्भाविना च निगद्यते।। (R.T. 2/49)

The pharmaceutical procedure of trituration of the powders of metals and ... substances by adding prescribed liquids in the Khalva yantra till they get dried ... called Bhavana.

Importance

सुभावितं हि अल्पमपि द्रव्यं स्यात् बहु कर्मकृत। (C. S. Kalpa 12/47)

The drug though less potent will attain more therapeutic properties ... ...vana.

...rocedure of Bhavana is used in the shodhana of Rasa dravyas like ... ... and others.

...g with the dosha nivarana, it also increases the potency and make ...icles very fine which aids in entering the minute channels (shrotonupra... ...ulting in better absorption and assimilation.

... is also used in the preparation of Khalveeya rasayanas, in the prepara... ...vatis and also in the Marana process to make chakrikas.

Quantity of Liquid for Bhavana

द्रवेण यावता द्रव्यं चूर्णितं स्वार्द्रतां व्रजेत्। तावानेव द्रवो देयो भिषग्भिर्भावनाविधौ।।
भाव्यद्रव्यमितः क्वाथ्यो जलमष्टगुणं ततः।वस्वंशशोषितः क्वाथो देयः क्वाथेन भावने।। (R. T. 2/50-51)

The quantity of liquid required for Bhavana is that which is sufficient to moist the powdered dravyas and to soak it completely. That quantity of liquid is used for the Bhavana. If the Bhavya dravya is kwatha, then kwatha should be prepared by adding eight times of water and the reduced kwatha is used for the purpose of Bhavana.

Bharjana

Literally, Bharjana means the act of roasting or frying. It is one of the paka vishesha. Frying the drug material in the pan with or without adding other substance or medium is known as Bharjana. This can be dry or wet (Frying or Roasting). The material is fried with or without Ghrita on mandagani (mild heat) e.g.– Gairika and tankana.

Importance

- This procedure is used in the shodhana of many Rasa dravyas like Gairika, and others.
- During bharjana, with evaporation of water content, some of the poisonous volatile and thermolabile content of raw material also gets destroyed.
- In Bharjana, due to agni samskara, the drug will become laghu and easy for absorption.

B) Marana

Definition

शोधितान् लोहधात्वादीं विमर्द्य स्वरसादिभिः। अग्निसंयोगतो भस्मीकरणं मारणं स्मृतम्।।

The pharmaceutical process in which the shodhita metals and mineral drugs are subjected to grinding with swarasa or other liquids like kwatha, ksheera etc and later subjecting them to heat at a specified temperature for a specific period and making them into bhasma form is called Marana.

Importance of Marana

मृतानि लोहानि रसीभवन्ति निघ्नन्ति युक्तानि महामयांश्च। अभ्यासयोगाद् दृढदेह सिद्धिं कुर्वन्ति रुग्जन्मजराविनाशम्।।
(R.R.S. 5/139)

- Marana process converts the metals and minerals into the suitable form in which they could be administered internally for achieving therapeutic values.
- Without Marana many Rasa dravyas produces various harmful and toxic effects.
- Marana process eliminates unwanted materials through higher temperature and suitable media.
- By marana process, hard, heavy, rough and bulky metals and minerals converts into soft, light, smooth and fine form.

- It converts hard solid material to a state of fine powder, increase the therapeuti value of the material in combination with suitable media.
- It aids in the achievement of qualities like Laghuta, Aruchi, Alpamatrapayogi and achieving Rasibhava (absorbable) form and increase the assimilation of the materia in the body.

Types of Marana

Marana is the process of bhasmeekarana where heat is provided to the metals and minerals to get converted into micro fine form. Various grades and sources of heat is required for different kinds of metals and minerals according to their physical and chemical characters. They can be by Agnipaka, Putapaka, Kupipakwa paka or Bhanupaka.

Agnipaka Method

- If the agni is employed for the process of marana, then that process of heating is called Agnipaka method.
- When the agni is used to boil the drugs in a vessel called Sthali with some liquid media till all the liquid gets evaporated is known as Sthalipaka. This method is mentioned in the context of loha marana.
- Triphala is mainly advocated for Sthalipaka. Gajakarna, Shatavari, Bhringraja, Kesharaja, Palasha are other prescribed drugs are also used.
- In Rasendra Sara Samgraha, Rasa Tarangini and Rasa Jala Nidhi, it has specified to use drugs according to the dosha involvement for particular disease.
- Rasendra Chintamaniand Chakradatta recommends to select the drugs according to the disease or prakriti of the patient.

Putapaka Method

If any of the puta is used in the marana of Rasa dravyas, then that process is called Putapaka method. Puta is the amount of heat that Rasadi Dravyas (Mercury/Metal/ Mineral) need to properly form their paka. In this method, Bhasma is being prepared by subjecting minerals or metals to three main procedures.

Shodhana → **Bhavana** → **Marana**

- Metals or minerals converted to coarse powder and subjected to Shodhana by various methods like bhavana, Nirvapa, Dalana etc., for specific times.
- Thereafter Shodhita dravyas are mixed with specific liquids and Bhavana is given for particular time period.
- Chakrikas are prepared after completion of Bhavana and after drying, they are sealed inside the 2 sharavas, placed one above the other with mud smeared clothes.

- Thus prepared Sharava Samputa is subjected for heating using specific Putasfor particular time period.
- These procedures repeated for multiple times to get desired quality of final Bhasma.
- In case of putilohas, one intermediate procedure called as Jarana is performed in between Shodhana and bhavana.
- Jarana involves melting and mixing of metals with some plant drugs and are rubbed until metals become complete powder form.
- Most of the metals and minerals like Abhraka, Makshika, all dhatus etc are converted to Bhasma form by putapaka method.

Kupipakwa Method

Kupi means bottle, here glass bottles are used for the preparation of Kupipakwa Bhasmas. This method includes the procedure of Shodhana, Kajjali Nirmana, Bhavana, and Kupipaka.

- After Shodhana, metals are subjected to form amalgam with mercury, and then purified sulphur is mixed and triturated till black, lusterless, fine and smooth powder is prepared. This procedure is called as Kajjali preparation.
- This prepared Kajjali is subjected to bhavana in a specified liquid medium for a certain time period.
- When the mixture becomes completely dry, it is filled in Kachkupi covered with 7 layers of mud smeared cloth.
- Bottle is then subjected to heating in Valuka Yantra for specific time period. Bottle is broken after self-cooling and the Bhasma is collected from bottom of the bottle.
- Then it is grounded to fine powder form which is nothing but the ultimate desired form.
- Bhasmikarana of dhatus can be done by kupipakwa method.

Bhanupaka Method

- If the process of paka is done using the heat of the sun, then that method is called as Bhanupaka.
- Bhanupaka means to digest the material by sun light. Example Bhanupaka of loha. In this, Lauha is powdered, decoction of Triphala is added to Shodhita Lauha and this mixture is kept in sunlight till drying.
- The bhasma made by this process termed with various names in different texts

like Swayamagni rasa in Rasa Ratnkar; Somamrita Lauha, Suryatapi Lauha bhasm in Ayurveda Prakasha and Yogaratnakar; Lauharasayana, Swayamagni rasa a Varitara Lauha in Sharanghadhara Samhita.

- In some texts Bhanupaka has told only for the Lauha (Iron), where as some oth texts advised this method for all Lauha (all metals).
- For bhanupaka, mainly Triphala is mentioned. However in some references, wat and kanji are also prescribed.
- The process is either performed continuously for 3 days or repeated for 7 time

Swanga Sheeta

बहिस्थमेव शीतं यत्तदुक्तं स्वांगशीतलम्। अग्नेराकृष्य शीतं यत्तद् बहिः शीतमुच्यते।। (R. R. S. 8/58)

While heating any substances, if that substance is allowed to cool on its ow (keeping in fire until complete burning and allowed to stay in heating place till becomes completely cool), then such condition is called swangasheeta. If the substanc is removed from the fire and cooled outside, it is called Bahisheeta.

C) Amrutikarana

लोहादीनां मृतानां वै शिष्टदोषापनुत्तये। क्रियते यस्तु संस्कार अमृतीकरणं मतम्।। (R. T. 2/58)

The pharmaceutical processing (samskara) done to eliminate the remaining dosha of mruta loha (incinerated metals- bhasmas) is called Amrutikarana.

Importance

Amrutikarana is not essentially required for all the bhasmas. It is done to few bhasmas like Abhraka and Tamra bhasma to remove left over doshas which are likely to remain even after marana process. This is done to make these bhasmas suitable for therapeutic uses.

- The word itself indicates making it Amruta i.e. the drug processed in this method turns into nector and thus the same effect in the body.
- It reduces the rukshata, teekshanata, ksharata procured by Agni samskara.
- Amruteekarana process increases the potency of the bhasma.

अरुणभस्मनस्तु पुनरमृतीकरणेन गुणवृद्धिर्वर्णहानिश्च भवति। (A.P. 1/135)

Along with doshanivarana, Amrutikarana also enhances the potency of the bhasmas and causes depletion in its colour for Abhraka bhasma.

C) Lohitikarana

The pharmaceutical process which is done to produce red colour in bhasma is called Lohitikarana.

Importance: Lohitikarana is not the common procedure done to all Bhasmas. If

proper colour is not obtained even after Bhasmikarana, then Lohitikarana is done to produce proper red colour. It is explained in the context of Abhraka bhasma.

D) Sattvapatana

क्षाराम्ल द्रावकैर्युक्तं ध्यातमाकरकोष्ठके। यस्ततो निर्गतः सारः सत्वमित्यभिधीयते।। (R.chu. 4/38. R.R.S 8/34)

When the prescribed dravya (Mineral or Ore) is triturated with required quantity of Kshara, Amla or Dravaka gana dravyas and subjected to required amount of heat in satvapatana koshti, the essence which has been extracted is termed as Satva. The process of extraction of satva through various pharmaceutical procedures is called Satwapatana.

Importance

योगेषूपरसादीनां योगे सत्त्वयोजनम् । गुणोत्तरं भवेद्यस्मात्तस्मात्सत्त्वं विशिष्यते।। (R. T.10 /90)

In the formulation containing Uparasa and other drugs, usage of their satva will be more beneficial. Hence by usage of satva instead of the drugs, the formulation will become more potent.

Satva is the essence of the dravya and it is the metallic portion of the compound. Example- Copper (Cu) is the satva of Makshika, Sasyaka, Mayurapiccha, Bhunaga; Iron (Fe) is the satva of Vimala, Gairika.

Satvapatana occurs in two stages which are Beejavarta and Shuddhavarta. Beejavarta indicates the melting of material and Shuddhavarta indicates the time for extraction of Satva.

D) Shuddhavarta

यदा हुताशो दीप्तार्चिः शुक्लोत्थान समन्वितः। शुद्धार्तस्तदा ज्ञेयः स कालः सत्व निर्गमे।। (R. R. S. 8/56)

When the fire burns intensively with the colour resembling the white, then such flames are called Shuddhavarta. Such condition is the indication of retrieving the satva from the minerals.

Shuddhavarta is termed as Lohavarta in Rasarnava and Rasa Kamadhenu.

Importance

This condition aids in assessing the process happening inside the sealed musha or sharava samputa, so as to know the time of extraction of satva during satvapatana.

D) Beejavarta

द्राव्यद्रव्यनिभा ज्वाला दृश्यते धमने यदा। द्राव्यस्योन्मुखता सेयं बीजावर्तः स उच्यते।। (R.R.S. 8/57)

In order to melt a metal, whenever a metal is blown in the fire, a specific coloured flame, pertaining to the colour of the metal, can be observed in the fire. This condition is called Beejavata. Such condition is an indicative of the melting of that metal.

Beejavarta is also known as Rekhavarta according to Ananda kanda. In Rasaarnava the author has mentioned different coloured flames produced by different dhatus at particular temperature which are as follows:

S.No.	Dhatus	Jwala varna
1	Swarna	Peeta (yellow flames)
2	Rajata	Sita (white flames)
3	Tamra	Neela (blue flames)
4	Teekshna Loha	Krshna (black flames)
5	Vanga	Krishna (grey black)
6	Naga	Malina dhumra (dirt smoky flames)
7	Shilajatu	Dhusara (dark grey)
8	Loha	Kapila (reddish brown flames)
9	Ayaskanta (kantaloha)	Dhumra (smoky flames)
10	Sasyaka	Lohita (reddish flame)
11	Vajra	Nanavidha (different colour flames)
12	Abhraka satva	Pandura (yellowish white flames)

Importance

This is a specific sign indicating the process happening inside and to ascertain the amount of heat to be provided. Colour of the flame also suggests that which metal is melting in the mineral.

E) Druti

Definition

औषधाध्मानयोगेन लोहधात्वादिकं तथा।
सन्तिष्ठते द्रवाकारं सा द्रुतिः परिकीर्तिता।। (R. R. S. 8/84)

Whenever any Metals or Minerals are processed with prescribed medicinal drugs and subjected to heat, the molten metal tends to remain in the form of liquid itself. Such molten liquid metals are called Druti of the particular dravya.

Druti Lakshana

निर्लेपत्वं द्रुतत्वं च तेजस्त्वं लघुता तथा। असंयोगश्च सूतेन पञ्चधा द्रुतिलक्षणम्।। (R.R.S. 8/83)

Five specific characteristics of Druti are-

1. Nirlepatva (non sticky)
2. Drutatva (remains in liquid state)
3. Tejasatva (lustrous)
4. Laghutva (light)
5. Asamyogasuta (readily mixes with parada)

F) Parada Samskara

Definition

The process of subjecting a substance to add specific qualities is called Samskara.

CharakAcharya has explained this term as gunantra dhana. By implication, during the process of Samskara or shodhana the metal or minerals acquires a different property is useful therapeutically & overcomes original harmful effects of metals.

Importance

Almost all RasAcharyas opines that, bala, teja, qualities of Parada can be enhanced. According to various authors, Ashtadasha samskara i.e. 18 Samskaras of Parada have been explained. Among them, first eight are for the purpose of roga-nivarana, rasayana and last ten are for rasayana & dhatu vedha purpose.

Ashtasamskara Parada

स्यात्स्वेदनं तदनु मर्दनमूर्च्छनं च उत्थापनं पतनरोधनियामनानि। सन्दीपनं..... (R.R.S.11/15)

Eight Samskaras of Parada are-

1. Swedana
2. Mardana
3. Moorchana
4. Utthapana
5. Patana
6. Bodhana
7. Niyamana
8. Deepana

Parada Jaranaa

सूते गन्धादिनिक्षेपात्तद्विधिविशेषतः। गन्धाद्य जार्यते यत्तु जारणं तदिहोच्यते।। (R.T. 5/100)

द्रुतग्रासपरिणामो विडयन्त्रादियोगतः। जारणेत्युच्यते तस्याः प्रकाराः सन्ति कोटिशः।। (R.R.S. 8/85)

The pharmaceutical procedure where the Gandhaka and other dravyas are methodically added to the Parada and made to digest within it, is called Jarana.

The procedure is carried out using Vida and different yantras like Kachchapa yantra and others where the grasa like Gandhaka and others are added in the molten state and made to get digested within the Parada. This procedure is called as Jarana and there are innumerable types of Jarana methods.

Importance

Jarana is one of the Samskara done to the Parada to increase its Rasayana effect and therapeutic property. Here, the drugs like Abhraka, Swarna and others are added to Parada along with vida and processing done using different yantras. And as a result, Parada will get the potency of the drugs added, but remains unchanged in its form, quantity and weight.

Murchchhana

तत्तद्विधिप्रभेदेन रसस्याव्यभिचारतः। व्याधिघातकता या स्यात् सा मता मूर्च्छना बुधैः।। (R.T. 6/1)

'अथाव्यभिचरित व्याधिघातकत्वं मूर्च्छनम्'। (A.P. 1/137)

The pharmaceutical procedures by which the parada attains definite and constan therapeutic properties is called Murchana.

CHAPTER TWO

Importance

To make parada fit for internal administration by winning over its chapalatva property and to imbibe definite therapeutic property, Murchana is done to Parada by adding Sulphur (saganda) or without adding sulphur (Nirganda). Saganda is more preferable, among which Kajjali is the prime and basic formulation and this forms a a base for other preparations like Parpati, Pottali, Kupi pakva and Khalviya Rasayana.

मारितं देहसिद्ध्यर्थं मूर्च्छितं व्याधिनाशने। रसभस्म क्वचिद्योगे देहार्थे मूर्च्छितं क्वचित्।। (A.P.1/396)

- Murchita Parada can cure all the diseases, when used with disease specific anupanas.
- Murchita Parada is beneficial for deha siddhi and to attain Amaratva.

Comparision of Jarana and Murchchana

Murchana and Jarana are the two different stages involved in various processing of Mercury to make it a stable compound. In Ayurveda prakasha, the terms Jarana and Murchana are used as synonyms. But by referring several Rasa classics it is clear that there is difference between Jarana and Murchana.

Jarana	Murchchana
Jarana is a process where in Gandhaka and other metals or minerals which are added to Parada are made digested by subjecting it into various process using any specified yantras.	Murchana is a process in which mercury is converted into such a form that it develops a definite disease curing capacity after subjecting it into various pharmaceutical process.
The weight of the mercury will not alter, even by adding other metals.	By adding other metals, minerals or herbal drugs, weight of the final product will be increased
After Jarana, the grasa like Abhraka, Suvarna etc., do not remain distinct and mercury remains in its preceding state	After Murchchana, ingredients added will remain distinct and mercury will attains different forms like, Vati, Parpati etc.,
Though Parada becomes more potent after Jarana, this cannot be administered internally in such form and does not possess vyadhi nashana property.	After Murchchana, Parada will become fit for internal administration and possess vyadhi nashana property.
Mainly used for the dhatuvada purpose.	Purpose is mainly for dehavada, specially for vyadhiharana.

Parada-Bandhas

येन येन हि चाञ्चल्यं दुर्ग्रहत्वं च नश्यति।। रसराजस्य संप्रोक्तो बन्धनार्थो हि वातिकैः।। (R.R.S. 11/60)

Parada bandha is the pharmaceutical process by which the chanchalya and durgrahatva property of Parada is lost. All such procedures are called as Parada bandha by RasAcharyas.

By bandhas, Parada will get rid of its liquidity and become solid. By this, it will become stable, so that it can be handled easily and administered to the patient.

हठारोटौ तथाभासः क्रियाहीनश्च पिष्टिका। क्षारः खोटश्च पोटश्च कल्कबन्धश्च कज्जलिः।।
सजीवश्चैव निर्जीवो निर्बीजश्च सबीजकः। शृङ्खला द्रुतिबन्धौ च बालकश्च कुमारकः।।
तरुणश्च तथा वृद्धो मूर्तिबन्धस्तथाऽपरः। जलबन्धोऽग्निबन्धश्च सुसंस्कृतकृताभिधः।।
महाबन्धाभिधश्चेति पञ्चविंशतिरीरिताः। केचिद्वदन्ति षड्विंशो जलूकाबन्धसंज्ञकः।। (R.R.S. 11/61-63)

There are 25 types of Parada Bandha

1.	Hata Bandha	10.	Kajjali Bandha	19.	Taruna Bandha
2.	Arota Bandha	11.	Sajeeva Bandha	20.	Vruddha Bandha
3.	Abhasa Bandha	12.	Nirjeeva Bandha	21.	Moorti Bandha
4.	Kriyaheena Bandha	13.	Nirbeeja Bandha	22.	Jala Bandha
5.	Pishtika Bandha	14.	Sabeeja Bandha	23.	Agni Bandha
6.	Kshara Bandha	15.	Shrunkala Bandha	24.	Susanskrutha Bandha
7.	Khota Bandha	16.	Dhruti Bandha	25.	Maha Bandha
8.	Pota Bandha	17.	Balaka Bandha		
9.	Kalka Bandha	18.	Kumara Bandha		

5. Pramanikarana Paribhasha (Terms For Standardization)

Ayurveda, for its globalization needs standardization. Standardization becomes necessary to rule out this uncertainty about proper identification and use of drugs. The classical guidelines should be kept as base to develop in newer directions. These classical guiding principles provide us the good objects to think and come up with newer ways towards perfection. We have many standardization parameters dealt in our classics. Few of them are-

A) Grahya-Agrahyattva

Grahya refers to "graspable" i.e., 'that which can be grasped' and opposite of it is Agrahya means 'ungraspable' i.e., 'that which should not be grasped'. In Rasa classics, we can find Graya-Agrahya lakshanas for each Rasa dravyas.

After identification of drugs, these need to be proved authentic. Grahya-Agrahya lakshanas of the dravyas will provide an insight towards confirmation of their identity and authenticity. Based on the lakshanas mentioned in our classics, one can clearly

assess the drugs which are to be grasped and which are to be rejected. These lakshana helps in determination of quality and purity of the drug. These lakshanas also form an basis for standardization of the raw drugs, which is the most essential part o standardization because the formulation which is prepared by using standard and good quality of ingredients with standard quantities under the standard processing, such formulation is considered as Standard. Another important objective of standardization is uniformity, which is also achieved by the Grahya- Agrahya lakshanas by Serving as a basis to evaluate similar substances.

Example: Grahya- Agrahya lakshanas of Parada

शुद्धः सूतो यतस्त्वन्तः सुनीलो बहिरुज्ज्वलः। सूर्यप्रभश्चाविशुद्धो धूम्रो वा परिपाण्डुरः।। (R.T.5/5)

Characteristics of Grahya Parada are Antah sunilah (Bluish tinge inside), Bahirujjwala (shining externally) and Madhyahna surya pratima prakasha (shines as bright as mid day sun). Characteristics of Agrahya Parada are Dhumra (smoky appearance), Paripandura (pale colour) and Chitra (with various shades and radiance).

A) Siddhilakshana

Siddhi lakshanas refers to the test of perfectness of the final product of any preparations. These lakshanas will as certain whether the desired quality of the preparation has attained or not.

सुपाकं हितमौषधम्

Paka is an important factor to ascertain the good quality of preparation as the medicine prepared with the suitable paka can only serves as an best medicine. Siddhi lakshanas will ensure the proper paka of preparations. So siddhi lakshanas are the most essential criteria for assessing the quality of the final product and also one of the prime factor in standardization of the finished product.

Example: siddhi lakshanas of Bhasma like Rekhapurnatva, Varitaratva etc.,

Siddhi lakshanas of Sneha paka like Varti formation when rubbed between 2 fingers, no sound produced when dropped in fire etc.,

B) Bhasma Pariksha

Varitara

मृतं लोहं विनिक्षिप्तं यदा तरति वारिणि। रसतन्त्रसुनिष्णातैस्तद् वारितरमीरितम्।। (R. T. 2/53)
मृतं तरति यत्तोये लोहं वारितरं हि तत्। (R.R.S. 8/27)

When the bhasma of a metal is placed over the stable water and if it floats without sinking in the water, then such bhasma is called Varitara bhasma.

Varitara test is one among the Bhasma pareeksha and it signifies the fineness and lightness of the bhasma. Bhasma will become so light that it cannot break the surface tension of the water.

Rekhapurnata

अंगुष्ठ तर्जनीघृष्टं यत्तद्रेखान्तरे विशेत्। मृतलोहं तदुद्दिष्टं रेखापूर्णाभिधानतः।। (R.R.S 8/27)

When the bhasma of a metal is rubbed in between the thumb and the index finger and if that bhasma be able to impregnate the finger lines, then such bhasma is called Rekhapurna bhasma.

Rekhapurna is also one of the test to check the perfectness of bhasma. It signifies the minuteness or fineness of the bhasma.

Unama

तस्योपरि गुरुद्रव्यं धान्यं चोपनयेद्ध्रुवम्। हंसवत्तीर्यते वारिण्युत्तम परिकीर्तितम्।। (R. R. S. 8/29)

When the properly formed bhasma placed over the stable water, it will float over it. The grain is placed upon this floating bhasma and if that grain does not sink and floats like swan, such bhasma is called Unama bhasma or Uttama bhasma.

Slakshnattva

The hard materials convert to soft and smooth bhasma form on subjecting to marana process. These qualities can be felt by simple touch with fingertips. Properly incinerated bhasma attain this quality. Slakshna bhasma can be absorbed and assimilated in the body without producing any irritation to mucous membrane of gastrointestinal tract.

Sukshma

Sukshma is very important quality of bhasma, Sukshma bhasma absorbed easily and possess fineness and lightness.

Anjana Sannibha

The bhasma formed should be micro fine and also smooth just like Anjana. In Anjana, each and every particles should be of micro fine, otherwise it will irritate the eyes even if single particle has not attained the required size. Anjana sannibha test confirms the uniformity of particle size along with its fineness and smoothness.

Dantagre na Kachakacha Bhavati

In this test when the bhasma is placed inside the mouth and pressed in between the teeth there should not be a typical "kach-kach" sound, it means that the particle should be so fine that there will be no hardness in the bhasma.

Varna

Dhatus attains different colours after they become bhasma. It is also one of the test to confirm its genuinity. The colour of the bhasma of the Dhatus are :

स्वर्णचम्पकवर्णाभं कृष्णत्वं ताराताम्रयोः। कांस्यं धूसरवर्णं स्यान्नागः पारावतप्रभः।।

वह्नं शुभत्वमायाति तीक्ष्णं जम्बूफलोपमम्। अभ्रकं च इष्टिकाभं स्याद्धातूनां वर्णनिर्णयः।। (Y. R. Purvardha)

S.No.	Dhatus	Bhasma Varna (Colour)
1	Swarna bhasma	Champaka varna (Golden yellow)
2	Rajata bhasma	Krishna varna (Black)
3	Tamra bhasma	Krishna varna (Black)
4	Tikshna Loha bhasma	Pakwa jambuphala varna (Purplish black)
5	Naga bhasma	Paravata varna (Grey)
6	Vanga bhasma	Shweta varna (white)
7	Kamsya bhasma	Dhusara varna (Smoky)
8	Abhraka bhasma	Ishtika varna (Brick red)

If the colour of prepared bhasma coincides with that of textual description i can be considered as one of the signs of properly prepared Bhasma. The colour of th bhasmas of the same drug may vary according to the media used, so this test can b taken as supportive one.

Avami

Ingestion of bhasma should not induce nausea or vomiting. The bhasma should not produce nausea on administration. This is not the general test to all the bhasmas This is specific to several bhasmas like Tamra bhasma.

Apunarbhava

समित्रञ्चकं ध्मातं प्रकृतिं नैति यत् पुनः। अपुनर्भवमुक्तं तन्निरुत्थं च तदीरितम्।। (R.T. 2/56)

गुडगुञ्जासुखस्पर्शमध्वाज्यैः सह योजितम्। नायाति प्रकृतिं ध्मानादपुनर्भवमच्यते।। (R.R.S.8/29)

The bhasma is triturated with equal quantity of mitra panchaka varga dravyas (Guda, Gunja, Tankana, Madhu, Ghrita) and subjected to required amount of heat in suitable puta. If its compounds is not reduced in to free metal form or if the bhasma has not regain its original state, then that bhasma is called Apunarbhava bhasma.

Apunarbhava is one of the test to check the perfectness of bhasma. Rationality behind this test is Mitra panchaka varga dravyas reduces the melting point of the metals and helps the metals to melt soon. So in this test, if any metallic particles left behind in the bhasma, it will melt, unites and solidifies when cooled. If no such metallic particles observed after this test, it indicates the genuinity of the bhasma in which complete metallic particles had converted into bhasma.

Niruttha

अपुनर्भवसंज्ञं यल्लोहे तारसमन्वितम्। यदा तारे न लगति तन्निरुत्थमिहोच्यते।। (R.T. 2/57)

रौप्येण सह संयुक्तं ध्मातं रौप्येण नो लगेत्। तदा निरुत्थमित्युक्तं लोहं तदपुनर्भवम्।। (R.R.S 8/30)

The bhasma of the metal is mixed with the silver and subjected to required amount of heat in suitable puta. If the bhasma does not adhere to the silver or if there is no change in the weight of the silver, then such bhasma is called Niruttha bhasma.

Niruttha is also one of the test to check the perfectness of bhasma. Rationality behind this test is if any metallic protion is left behind in the bhasma, it adheres to the silver because of high affinity of silver towards metals. If bhasma does not adhere to the silver or if silver remains unaltered in its weight, it suggests the purity of bhasma without any metallic portion.

Gata Rasattva

The properly processed bhasma becomes tasteless. The presence of taste in bhasma indicates the imperfectness of bhasma. This may be due to less heat and the presence of inorganic substances. If bhasma has any taste, it is considered as improperly formed bhasma and should be subjected to puta again.

Nischandrattva

Bhasma should be lustureless. The sparkling particles (chandrika) in a bhasma indicates the imperfect product. Bhasma, when observed under bright sunlight, it must be luster free. Chandratva (luster) is a character of metal. This should not remain after proper incineration. Therefore Bhasma is observed under bright sunlight, if luster is present, it suggests for further incineration. Lustrous particles in bhasma shows the presence of free metal, which is indicative of improper incineration. Bhasma must be Nischandra for best quality and potency This test is specially employed for the drugs like Abhraka and other lusturous drugs.

Niramlattva

The properly formed Bhasma should be devoid of amlata.

Nirdhumattva

Bhasma placed on burning coal should not produce fumes. This test is mainly employed for Haratala, Gouripashana and Parada Bhasmas. On dusting the bhasma over an ignited red hot coal piece, there should be absence of smoke from it.

Jihvagre Adahyamanattva

Bhasmas should not produce any burning sensation when placed over the tip of the tongue. This test is done by placing a small pinch of bhasma at the tip of the tongue, if it produces any burning sensation, it signifies the improper preparation of Bhasma and this need to be incinerated further.

Amla Dadhi/ Nimbu Pariksha

These tests are specially advocated for Tamra bhasma.

Dadhi Pariksha : When bhasma is sprinkled on sour curd, it should not produc any colour change on curd surface even after 24 hours.

Nimbu Pariksha: After mixing bhasma with lemon juice, it should not produc any change of colour in the solution even after twelve hours.

6. Puraka Paribhasha (Supplementary)

Rudra Bhaga

भैषज्यक्रीणितद्रव्यभागोऽप्येकादशो हि यः। वणिग्भ्यो गृह्यते वैद्यै रुद्रभागः स उच्यते।। (R. R. S.8/3)

1/11 portion of the medicine (or the cost of medicine), which is purchased by th physician or patient (on physician prescription) from drug merchants should go t physician. This share of money or medicine given by the drug merchant is called a Rudra bhaga.

Dhanvantari Bhaga

अर्ध सिद्धरसस्य तैलघृतयोर्लेहस्य भागेऽष्टमः संसिद्धाखिललोहचूर्णवटकादीनां तथा सप्तमः।
यो दीयेत भिषग्वराय गदिभिर्निर्दिश्य धन्वन्तरिम् सर्वाऽऽरोग्यसुखाप्तये निगदितो भागः स धन्वन्तरेः।।

(R. R. S.8/2

Dhanwantari bhaga is the share of medicine given by the patient to the physician (who has prepared the medicines for the patient). The portion of medicine differ fo different types of preparation like-

½ Part	⅛ Part	1/7th Part
• Rasoushadhies • Taila • Ghrita	• Avaleha	• Lohas (Dhatu Preparation) • Churna • Vataka; etc.

Above portion of medicine should be offered by the patient to the physician in the name of Lord Dhanwantari in order to win over the diseases, with the intention of attaining health and happiness.

7. Mana-Paribhasha

A) Definition

मीयते अनेन इति मानम्।। (Amarakosha)

Mana is defined as the system of measurement, through which the weight, volume or length of a substance is measured.

A) Classical Types

कलिङ्गं मागधं चेति द्विविधं मानमुच्यते। कलिङ्गान् मागधं श्रेष्ठं मानं मानविदो विदुः।। (Sha.Sam.Pra.Kha.1/3-4)

In our classics, mainly two types of mana are explained based on the area in which the systems of measurements prevailed. They are:

1. Magadha mana (followed by Acharya Charaka)
2. Kalinga mana (followed by Acharya Sushruta)

Among these 2 types of Mana, Magadha mana is considered to be superior.

पौतवं द्रुवयं पाय्यमिति मानार्थकं त्रयम्। (Amarakosha 2/9/85)

Depending on the nature of the measuring substances, 3 types of Mana are mentioned in Amarakosha as-

1. Pautava mana (measures of weight or mass)
2. Druvaya mana (measures of capacity)
3. Payya mana (measures of length)

Importance

मानमादौ परीक्षेत योगान्निर्मापयेत्ततः। योगनिर्माणसिद्ध्यर्थं मानं निर्दिश्यतेऽधुना।।६०।। (R.T. 2/60)

Mana is the prerequisite and prime factor to be considered before any pharmaceutical preparations.

न मानेन विना युक्तिर्द्रव्याणां जायते क्वचित्। अतः प्रयोग कार्यार्थं मानमत्रोच्यते मया।। (Sha.Sam.Pra.Kha 1/14)

Without the proper knowledge of Mana, it is not possible to quantify the drugs both for formulating the preparations and also administering the prepared drugs.

दोष-भेषज-देश-काल-बल-शरीर-सार-आहार-सात्म्य-सत्व-प्रकृति-वयसां मनमवहितमनसा यथावज्ज्ञेयं भवति भिषजा, दोषादिमानज्ञानायत्तत्वात् क्रियायाः। न ह्यमानज्ञो दोषादीनां भिषग्व्याधिनिग्रह समर्थो भवति।। (Cha. Sam. Vi.St.1/3)

According to Acharya Charaka, it is important to estimate dosha, desha, kala, bala, sharira, sara, ahara, satmya, satva, prakriti, vayas of a patient and also bhesaja qualitatively and quantitatively to get success in the treatment. For this purpose, knowledge of Mana paribhasha is very essential.

B) Classical and Modern- Conversion chart as per AFI

The following table of metric equivalents of weights and measures, linear measures and measurement of time used in the Ayurvedic classics have been approved by the Ayurvedic Pharmacopoeia Committee in consultation with Indian Standards Institution.

B) Metric Equivalents of Classical Weights and Measures

I. Measurements of Weights

Classical unit		Metric Equivalents
1 Ratti or Gunja		= 125 mg.
8 Rattis or Gunjas	= 1 Masha	=1 g.

12 Masha	= 1 Karsha (Tola)	= 12 g.
2 Karshas (Tolas)	= 1 Shukti	= 24 g.
2 Shuktis (4 Karshas or Tolas)	= 1 Palam	= 48 g.
2 Palas	= 1 Prasriti	= 96 g.
2 Prasritis	= 1 Kudava	= 192 g.
2 Kudavas	= 1 Manika	= 384 g.
2 Manikas	= 1 Prastha	= 768 g.
4 Prasthas	= 1 Adhaka	= 3 kg. 73 g.
4 Adhakas	= 1 Drona	= 12 kg. 228 g.
2 Dronas	= 1 Surpa	= 24 kg. 576 g.
2 Surpas	= 1 Droni (Vahi)	= 49 kg. 152 g.
4 Dronis	= 1 Khari	= 196 kg. 608 g.
100 Palas	= 1 Tula	= 4 kg. 800 g.
20 Tulas	= 1 Bhara	= 96 kg.

II. Linear Measurements

Classical Unit	Inches	Metric Equivalents
Yavodara	= 1/8th of 3/4"	= 0.24 cm.
Angula	= 3/4"	= 1.95 cm.
Vitasti	= 9"	= 22.86 cm.
Aratni	= 10 1/2"	= 41.91 cm.
Hasta	= 18"	= 45.72 cm.
Nrupahasta (Rajahasta)	= 22"	= 55. 88 cm.
Vyama	= 72"	= 182.88 cm.

B) Scientific Metrology

Scientific metrology deals with the study, organisation, maintenance and development of the standards of the International System of Units (SI) system. This is undertaken by National Measurement Institutes through the realisation of scientific theories and the confirmation of these internationally.

Scientific metrology defines the standards to provide a definite magnitude of any physical quantity. It is the foundation of all the subfields of metrology. Scientific metrology lays the ground work for all other types of metrology, which is why it is also known as fundamental metrology. Scientific metrology focuses on five main tasks:-

1. The development of new measurement units

2. The development of measurement unit systems
3. The development of measurement methods
4. The creation and maintenance of measurement standards
5. The transfer of measurement standards to users

The Scientific Metrology Department is responsible for the certification of every new weighing and measuring equipment before it is use in the country by approving its pattern if it conforms to acceptable Standards. Pattern approval criteria adopted by the Department are generally in accordance with the recommendations of the International Organization for Legal Metrology (OIML). The organization responsible for international scientific metrology is the National Metrology Institutes (NMI), along with coordination by the International Bureau of Weights and Measurements (BIPM).

Importance

- Scientific Metrology in the field of national measurement standards is of primary importance, since it is the prerequisite for the development of other branches of metrology as well as new technologies and for development of the society as a whole.
- Accurate measuring technology ensures product quality. Proper measurements are essential to ensure quality products.
- The accuracy and precision of these measurements are necessary to meet safety and quality requirements for public use or consumption.
- It drives the standardization of industrial and manufacturing processes.

C) Essential Kala-mana

Time Measurement

Classical Unit		Equivalents (in hours, minutes & seconds)
2 Kshana	= 1 Lava	
2 Lavas	= 1 Nimesha	
3 Nimeshas	= 1 Kastha	= 4.66 seconds
1 Ghati		= 24 Minutes
30 Kasthas	= 1 Kala	= 2 Minutes 20 Seconds
20 Kala + 3 Kashthas	= 1 Muhurta	= 48 Minutes
30 Muhurtas	= 1 Ahoratra	= 24 Hours.
1 Yama	= Prahara	= 3 Hours
15 Ahoratras	= 1 Paksha	= 15 Days
2 Pakshas	= 1 Masa	= 30 Days/One month

Discussion

Ayurveda aushadha nirmana shastra including both Rasashastra and Bhaishajya kalpana is a vast subject with many technical terms. Most of the processing preparations and concepts are unique in their way. So before entering into the subject for study, adequate knowledge about their technical terms is mandatory for its proper understanding. This also provide clarification of the ambiguity with due regards to the terminologies and drugs. Physician becomes inefficient without the knowledge of Paribhasha just as the Chandra looks pale without moon light and Surya will be dull without its rays. Hence the knowledge and keen interpretation of these principles with respect to both Ayurvedic and modern science is the secret to learning, as well as to study and extension in pharmaco-therapeutic method.

Conclusion

Paribhasha teaches the proper interpretation or application of technical terms. Knowledge of these terminologies and concepts of Rashastra and Bhaishajya kalpana is necessary for the comprehension study and advancement of this Ayurvediya aushadha nirmana vignana.

Extended learning

- Enlist and discuss Sandigdha, Krutrima, Pratinidhi and Anupalabdha dravya.
- Describe Grahyagrahya parameters used for selection of Rasadravyas.
- Define the word Siddhilakshani. Recite examples of classical siddhilakshani. Interpret its rationality
- Recognise and discuss Dhanvantari Bhaga and Rudra bhaga
- Categorize parameters of Drug Standardization and develop a checklist for assessment of quality of rasadravyas
- Explain Value of selection of genuine raw material
- Explain importance of ethical practices for drug processing (Shodhana, Marana)
- Discuss and justify importance of Bhasma Pariksha
- Explain value of keen and accurate application of weights and measures in Ayurvediya Aushadhi nirmana

References

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MODEL QUESTIONS

Short Answers

- Define and describe the applications of Technical terminologies (Paribhasha): Murchana, Amrutikarana.
- Explain the Concept of Shodhana and mention the various methods of shodhana with their application.
- Define Marana and explain in brief about Bhasma Pareeksha.
- Describe the manufacturing process of Rasanjana.
- Define paribhasha and explain Bhavana.
- Enumerate Mitrpanchaka and write its importance in Rasashastra.
- Describe the applications of Technical terminologies: Apunarbhava, Niruttha with regards to modern chemistry.
- Describe the applications of Technical terminologies: Apunarbhava, Niruttha.
- Rekhapurna, Varitara in terms of modern physics.
- Brief Description and Application of Bhavana.
- Brief Description and Application of Jarana.
- Explain Rudra Bhaga and Dhanvantari Bhaga.
- Explain the verse: संस्कारोहिगुणान्तराधानमुच्यते।
- Enumerate Maharasa and write the rationality behind its classification.
- Write the controversies of Chapala.
- Enlist the various opinions about Kankushta.
- Write the artificial method of preparation of Kasisa.
- Substantiate: Vajrabhave Vaikranta.
- Define Marana. Write its importance and types.
- Define the term Mana and explain the importance of Mana in Bhaishajya Kalpana.
- Classical and Modern- Conversion chart as per AFI.
- Write a short note on Scientific Metrology.
- Write about Kala-mana.

CHAPTER 3

ADHARABHUTA SIDDHANTA
(APPLICATION OF FUNDAMENTAL PRINCIPLES)

PAPER 1

Contents

- **Dravya Sangraha and Samrakshana:** Time of drug Collection, General Rules, Specifi time for specific plant part collection, Time of the day for drug collection, Collectio of Pranija Dravya, Place of Drug collection, Bhumi mahabhuta predominance, Place from where drugs should not be collected, Stage of drug collection, Rule of Duplicatio (Dwiguna Mana Ganana), Ardra and Shushka Dravya mana, Dravya Sangraha Vidh and Dravya samrakshana, Rasa, Guna, Virya, Vipaka, Prabhava.
- **Anukta Visheshokta grahana:** Considering Anukta Dravya
- **Aushadha Namakarana:** Naming a Preparation
- **Aushadha Sevana Kala:** Time of Drug Administration
- **Saveeryata Avadhi** (Shelf life of different kalpana)
- **Aushadha Matra:** Dosage/Posology
- **Anupana & Sahapana** (Adjuvant)
- Yougika Dravya Siddhanta (Drug Combination)

Learning Outcome

At the end of this chapter, Students can able to

1. Elaborate fundamental principles of Ayurvediya Aushadhi Nirmana alongwith the classical references.
2. Explain Dravya Samgraha vidhi. Explain types of Bhumi desha and types of drugs be collected from particular place & places from where Dravya should not be collecte
3. Describe time of Dravya collection.
4. Enlist parts of Sthavara & Jangama Dravyas used for Ayurvediya Aushadhi nirmana
5. Discribe Ardra - Shushka Dravya & Anukta-Visheshokta paribhasha
6. Describe importance of kalpa sevana matra. Explain factors considered for decidi dosage of any drug. Describe Posology
7. Explain Saveeryata Avadhi (Shelf life) of Ayurvedic dosage forms.
8. Discuss Yogika Dravya Sidhdhanta (Drug combination)
9. Explain importance of Kala (Time) Samskara in Ayurvediya Aushadhi Nirmana. Elabora Aushadhi sevana kala mentioned in Sharangdhara samhita.
10. Justify Aushadhi kalpa namakarana siddhanta with examples.

Introduction

Bheshaja Kalpana or the Pharmaceutical Science deals with the systemat preparation of medicines. In the process of preparation of medicines, the princip

adopted for the collection of raw materials, their preservation, process of preparation and therapeutics plays an important role in the preparation of good quality of medicine.

Principles For the Collection of Raw Materials

General Rule

गृह्णीयात्तानि सुमनाः शुचिः प्रातः सुवासरे।। आदित्यसंमुखो मौनी नमस्कृत्य शिवं हृदि। साधारणधराद्रव्यं गृह्णीया -दुत्तराश्रितम्।। बल्मीककुत्सितानूपश्मशानोषरमार्गजाः। जन्तुवह्निहिमव्याप्तानौष्ध्यः कार्यसिद्धिदाः।। (Sha. Sam Pra. Kha 1/56-58)

Drugs should be collected in the early morning of an auspicious day after Sunrise, with a calm mind after performing prayer to Lord Shiva. Collect the drug which has grown in the Northern direction of the place where he is collecting the drug.

तत्र देशे साधारणे जाङ्गले वा यथा कालं शिशिरातपपवनसलिलसेविते समे शुचौ प्रदक्षिणोदके श्मशानचैत्यदे- वयज्ञनागार-सभा-श्वभ्राराम-वल्मीकोषरविरहितेकुशरोहिषास्तीर्णे स्निग्धकृष्णमधुरमृत्तिके सुवर्णवर्णमधुरमृत्तिके वा मृदा- वफालकृष्टेऽनुपहतेऽन्यैर्बलवत्तरैर्द्रुमैरौषधानि जातानि प्रशस्यन्ते।। (Cha. Sam, Ka. St, 1/9)

आग्नेया विन्ध्यशैलाद्याः सौम्यो हिमगिरिर्मतः। (Sha. Sam Pra. Kha 1/55)

Generally Ushna veerya drugs should be collected from Vindhya Mountain and Sheeta veerya drugs should be collected from Himalayan Mountain.

Qualities of the Drug Collector

मङ्गलाचारः कल्याणवृत्तः शुचिः शुक्लवासाः संपूज्य देवता अश्विनौ गोब्राह्मणांश्च कृतोपवासः प्राङ्मुख उदन्मुखो वा गृह्णीयात्।। (Cha. Sam, Ka. St 1/10)

The person who collects the drug should perform prayers, having good vertuous, clean, wearing white cloths, performed worship to God Ashwini Kumara, Cows and Brahmins, in empty stomach, turning towards north or east one should collect the drug.

Time of Drug Collection

गृह्णीयात्तानि सुमनाः शुचिः प्रातः सुवासरे। (Sha. Sam Pra. Kha, 1/56)

On auspicious day (on the day of Pushya Nakshatra, Sunday or Thursday) drugs should be collected in the early morning.

Season For the Drug Collection (General)

शरद्यखिलकार्यार्थं ग्राह्यं सरसमौषधम्। विरेकवमनार्थं च वसन्तान्ते समाहरेत्।। (Sha. Sam Pra. Kha, 1/59)

Sharad Ritu (October- November) is the best season to collect the drugs for the preparation of medicine for all the purposes. End of Vasantha ritu (March) is best for the drugs used for Vamana and Virechana.

Specific Season For the Collection of Drugs

तेषां शाखापलाशमचिरप्ररुढं वर्षावसन्तयोर्ग्राह्यं ग्रीष्मे मूलानि शिशिरे वा शीर्णप्ररूढपर्णानां, शरदि त्वक्कन्दक्षीराणि, हेमन्ते साराणि यथर्तुं पुष्पफलमिति। (Cha. Sam, Ka. St, 1/10)

S.No.	Plant Part	Charaka Samhita	Sushruta Samhita	Raja Nighantu	Bhaishajya Ratnavali
1	Moola	Greeshma, Shishira	Pravrit	Shishira	Shishira, Greeshma
2	Patra	Varsha, Vasanta	Varsha	Shishira	Varsha, Vasanta
3	Shakha	Varsha, Vasanta	-	-	-
4	Pushpa	Yatha Ritu	-	Vasanta	Yatha Ritu
5	Phala	Yatha Ritu	Grishma	Vasanta	Yatha Ritu
6	Sara	Hemanta	Vasanta	-	Hemanta
7	Twak	Sharad	Sharad	-	-
8	Kanda	Sharad	-	Hemanta	Sharad
9	Kshira	Sharad	Hemanta	-	-
10	Panchanga	-	-	Sharad	

तत्रकेचिदाहुराचार्याः....तत्तुवसम्यक, सौम्याग्नेयत्वाज्जगतः सौम्यान्यौषधानि सौम्येष्वृतुष्वाददीतआग्नेयान्याग्नेयेषु... (Su. Sam, Su. St, 37/7)

S.No	Dravya	Time of collection
1	Soumya (Sheeta Veerya)	Soumya Ritu (Vasanta, Hemanta and Shishira)
2	Agneya (Ushna Veerya)	Agneya Ritu (Sharad, Varsha and Greeshma)

ग्रीष्मे मूलानि शिशिरे वेतिकथनेनयान्याग्नेयानि तेषां मूलानि ग्रीष्मे, यानि सौम्यानि तेषां मूलानि शिशिरे, प्रावृषि तिव्यवस्थांसूचयति.....। (Cha. Sam, Ka. St 1/20, C.P)

Chakrapani mentioned that the root of Ushna veerya dravyas should be collected in Greeshma Ritu and the root of Sheeta veerya dravyas in Shishira ritu.

Time for the collection of the drug where whole plant is used

सर्वावयवसाध्येषुपलाशलवणादिषु। व्यवस्थितोनकालोऽस्तितत्रसर्वोविधीयते।। (Su. Sam, Su. St. 36/11)

If the medicine is prepared from the whole Plant, then there is specified time in the collection of the material.

Drug Collection Based on Mahabhoota Predominance

तत्र पृथिव्यम्बुगुणभूयिष्ठायां भूमौ जातानि विरेचनद्रव्याण्याददीत। अग्न्याकाशमारुतगुणभूयिष्ठायां वमनद्रव्याणि यगुणभूयिष्ठायां उभयतोभागानि। आकाशगुणभूयिष्ठायां संशमनानि एवं बलवत्तराणि भवन्ति। (Su.Sam, Su. St. 3

S.No.	Karma	Type of Bhoutik (Mahabhoota Predominance)
1	Virechana	Prithvi and Jala
2	Vamana	Agni, Akasha and Vayu
3	Ubhayatobhagahara	Prithvi, Jala, Agni, Akasha and Vayu
4	Shamana	Akasha

Drug Collection Based on Part of the Plant

अविकृतवट वः स्कन्धत्वचं शाखात्वचो वृधैः। मूलिकामूलमूलानि सकलान्यपि बुद्धिमान्।
त्वचोपादेयत्वचो शाखाः सारः स्याद्विकलादिकः। तलिसारेऽपि पत्राणि फलं स्यात् त्रिफलादिकः।।
धातकीसारेऽपि पुष्पाणि स्नुहीसारेऽपि क्षीरमाहरेत्। (Sha. Sam. Pra. Kha. 1/60-61)

S.No.	Parts of the Plant	Example
1	Moola Twak (root Bark)	Brihat Panchamoola
2	Whole root	Laghu Panchamoola
3	Twak (Stem Bark)	Nyagrodha
4	Saara(Pith)	Beejaka
5	Patra (Leaves)	Talisa
6	Phala (Fruit)	Triphala
7	Pushpa (Flower)	Dhataki
8	Ksheera (Latex)	Snuhi

Collection of Pranija (Jangama) Dravya

जङ्गमानां वयः स्थानं रक्तरोमत्वगादिकम्।
क्षीरमूत्रपुरीषाणि जीर्णाहारेषु संहरेत्।। (Su. Sam, Su. St, 36/16)

Pranija Dravya (Animal Products) which are used for the preparation of Medicine should be collected as mentioned by Sushrutha.

S.No.	Pranija Dravya	Collection time
1	Rakta (Blood)	Vayastha (Adult Animal)
2	Roma (Hair)	Vayastha (Adult Animal)
3	Nakha(Nail)	Vayastha (Adult Animal)
4	Ksheera (Milk)	Jeernahare (After the digestion of food)
5	Mutra(Urine)	Jeernahare (After the digestion of food)
6	Purisha (feces)	Jeernahare (After the digestion of food)

As per the Text Book of Pharmacognosy by T. E. Wallis

अत्र केचिदाहुराचार्याः प्रावृड्वर्षाशरद्धेमन्तवसन्तग्रीष्मेषु यथासंख्यं मूलपत्रत्वक्क्षीरसारफलान्याददीते..... (Su. Sam, Su. St 3

कन्दं हित शिशिरे च मूलं पुष्प वसन्ते फलदंवदन्ति। प्रवाल पत्राणि निदाघकालेस्युः पञ्चजातानिशरत्प्रयोगे।। (R.
मूलानि शिशिरे ग्रीष्मे, पत्रं वर्षावसन्तयोः। कन्दानि शरदि क्षीरं, वथर्तुकुसुमं फलम्।।
हेमन्ते सारमोषध्या, गृहणीयात्कुशलोभिषक्।। (R. Paribhasha 4/59)

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6	Sara	Hemanta	Vasanta	-	Hemanta
7	Twak	Sharad	Sharad	-	-
8	Kanda	Sharad	-	Hemanta	Sharad
9	Kshira	Sharad	Hemanta	-	-
10	Panchanga	-	-	Sharad	

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4	Shamana	Akasha

Drug Collection Based on Part of the Plant

अतिस्थूलजटा याः स्युस्तासां ग्राह्यास्त्वचो बुधैः। गृह्णीयात्सूक्ष्ममूलानि सकलान्यपि बुद्धिमान्।
न्यग्रोधादेस्त्वचो ग्राह्याः सारः स्याद्बीजकादितः। तालीसादेश्च पत्राणि फलं स्यात् त्रिफलादितः।।
धातक्यादेश्च पुष्पाणि स्नुह्यादेः क्षीरमाहरेत्। (Sha. Sam Pra. Kha, 1/60-61)

S.No.	Parts of the Plant	Example
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Collection of Pranija (Jangama) Dravya

जङ्गमानां वयः स्थानां रक्तरोमनखादिकम्।
क्षीरमूत्रपुरीषाणि जीर्णाहारेषु संहरेत्।। (Su. Sam, Su. St, 36/16)

Pranija Dravya (Animal Products) which are used for the preparation of Medicine should be collected as mentioned by Sushrutha.

S.No.	Pranija Dravya	Collection time
1	Rakta (Blood)	Vayastha (Adult Animal)
2	Roma (Hair)	Vayastha (Adult Animal)
3	Nakha(Nail)	Vayastha (Adult Animal)
4	Ksheera (Milk)	Jeernahare (After the digestion of food)
5	Mutra(Urine)	Jeernahare (After the digestion of food)
6	Purisha (feces)	Jeernahare (After the digestion of food)

As per the Text Book of Pharmacognosy by T. E. Wallis

S.No.	Parts of the Plant	Season
1	Bark	Spring or early Summer
2	Leaves	Flowers are just beginning to expand or the flowering just arriving at its height
3	Flowers	1. Fine and dry weather. 2. Flowers come to proper condition upon the inflorescenc

As Per WHO

S.No.	Plant parts	Time and method of collection
1	Bulbs	Late autumn, long after the plant has flowered and fruited. Bulbs should be dug from considerable distance from the main plant. Collect mature big bulbs and leave small bulbs for regeneration. Bulbs/roots should be collected only after the seed shedding unless otherwise specified. It facilitates regeneration of species.
2	Bark	Autumn (after leaf fall) or spring (before development of leaves). Remove the bark in long vertical strips using a thin flexible blade bush knife. Stem bark should not be collected again from same tree unless adequate time has been allowed for it to regenerate completely. Do not practice ring barking, which is the cut off of entire rings around the tree. From annuals, shortly before flowering. From biennials, during the autumn or winter following the first year growth.
3	Root and rhizomes	From perennials, during autumn or winter following the second or third year's growth. Dig the root at a considerable distance, at least 30 cm, from the main stem or tap root. Avoid severing of the tap root. Do not collect all roots from the plant. Collect only the lateral roots.
4	Leaves	Collection should be made in dry weather whilst the plant is flowering. Pluck individual leaves instead of leaf striping and avoid use of sharp pruning shears for leaves. Collection in the morning is providing quality product in some plants (solanaceous leaves). Leaves should be harvested before or at the time of initiation of flowering unless otherwise specified.
	Flowers	Collection should be made in dry weather and in early hours of the day, after due has dissipated. Harvest flowers carefully without damaging plant main stem. Flowers must be harvested when they have just opened or shortly afterwards to capture its aroma.

6	Seeds and fruits	Collection should be made when fruits are fully grown and ripe or nearly ripe until otherwise it is required. To avoid seed dispersal, it is advantageous to collect slightly earlier.In forest areas, only collect fruits from some trees and leave others completely for regeneration. Branches of the tree or shrub should not be cut for ease of collection of fruits and seeds.
7	Annual herbs/ whole plant	Annual herbs should be harvested at the time of initiation of flowering. Whole population in a given area should never be harvested. Adequate population should be left for regeneration to facilitate future collection.

Place from where Drugs should not be Collected

वल्मीक कुत्सितानूप श्मशानो ऊषर मार्गजाः। जन्तुवह्निहिमव्याप्तानौषध्यः कार्यसिद्धिदाः।।

(Sha. Sam Pra. Kha, 1/58)

Drugs used for the preparation of Medicine should not be collected from the places like Valmika (Ant Hill), Kutsita (Bheebatsa Sthana- Place where Black magic are Performing), Anupa (Marshy Land), Smashana (Burial Ground) Ushara (Saline Sand), Marga (Walking path), Jantu Pidita (Where poisonous animals dwells), Agnidagdha (place where fire burn occurred) and Himavyapta (covered by Snow).

Stage of Drug Collection

तत्र देशे साधारणे जाङ्गले वा यथाकालं शिशिरातपपवनसलिलसेविते समे शुचौप्रदक्षिणोदके श्मशान-चैत्यदेव-यज्ञनगार सभां श्वभ्राराम-वल्मीकोषरविरहिते कुशरोहिषास्तीर्णे स्निग्धकृष्णमधुरमृत्तिके सुवर्णमधुरमृत्तिके वामृदाव-फालकृष्टेऽनुपहतेऽन्यैर्बलवत्तरैर्दुर्मैरौषधानि जातानि प्रशस्यन्ते।। (Cha.Sam.,Ka.St., 1/9)

The drugs has be collected from Sadarana or Jangala desha, there should be proper Winter, Summer and Rainy season and the place should be flat and clean. In such places, the plants packed with Rasa, Guna, Veerya and Vipaka has to be collected.

Utilization of the Raw Materials

नवान्येव हियोज्यानिव्याण्यखिलकर्मसु। विना विडङ्गकृष्णाभ्यं गुडधान्याज्यमक्षिकैः।। (Sha. Sam Pra. Kha, ¼4)

When medicines are preparing, it is advised to use fresh drugs except for few drugs which should be used when they became purana(one year old) like Vidanga, Pippali, Guda, Ajya and Madhu.

विगन्धेनापरामृष्टम् अविपन्नं सादिभिः। नवं द्रव्यं पुराणं वाग्राह्यमेव विनिर्दिशेत्।। (Su. Sam, Su. St 36/15)

Sushruta Mentioned that we can use Nava and purana oushadha dravya for the preparation of medicines if all the Rasapanchakas are intact.

Rule of Dwiguna mana (Double the Quantity)

शुष्कं नवीनं यद् द्रव्यं योज्यं सकलकर्मसु। आर्द्रयद्विगुणं युञ्ज्यादेष सर्वत्र निश्चयः। (Sha. Sam Pra. Kha, ¼6-47)

During the preparation of medicine at most care should be taken regarding the selection of drugs. Dry and Fresh raw materials have to be considered during the preparation. If fresh drug has to be taken it should be taken in double the quantity as recommended in the classics.

गुडूची कुटजो वासा कूष्माण्डश्च शतावरी। अश्वगन्धा सहचरी शतपुष्पा प्रसारिणी।।
प्रयोक्तव्यास दैवार्द्रा द्विगुणा नैव योजयेत्। (Sha. Sam Pra. Kha, 1/45)

CHAPTER THREE

Even though it is mentioned the double the quantity for fresh drugs, Guduchi, Kutaja, vasa, Kushmanda, Shatavari, Ashwagandha, Sahachara, Shatapushpa and Prasarani should not be taken in double the quantity.

शुष्कस्य गुरुतीक्ष्णत्वात्तस्मादर्द्धं प्रकीर्तितम्। (Vai.Pa. Pra.Pra. Kha 47)

As Shushka Dravyas are Guru and Teekshna, it should be taken in the same quantity as mentioned.

As fresh drugs contain larger quantity of water, the weight of water will also add up in the total weight of the drug. Hence it should be taken double the quantity.

Apart from the durgs mentioned by Sharangadhara, in Vaidyaka Paribhasha Pradeepa Prathama Khanda Nimba, Patola, Ketaki, Bala, Punarnava, Putigandha, Jatamamsi, Nagabala, Guggulu, Hingu, Ardraka, Ikshu vikara, Atibala, Hastikarna, Vatyalaka, Goraksha and Tandula should be taken in the same quantity as mentioned in the classics.

Ardra and Shushka Dravyamana

गुञ्जादिमानमारभ्य यावत्स्यात्कुडवस्थितिः। द्रवार्द्रशुष्कद्रव्याणां तावन्मानं समं मतम्।
(Sha. Sam Pra. Kha, 1/33-34)

In a single compound preparation, when dry drug, fresh drug and any liquid are using the quantity of the ingredients are mentioned as below

S.No.	Quantity of the Drugs	Drava (Liquid)	Ardra (Fresh Drug)	Shushka (Dry Drug)
1	1 gunja- 1 kudava	Quantity as mentioned	Quantity as mentioned	Quantity as mentioned
2	1 kudava- 1 tula	Double the quantity	Double the quantity	Double the quantity
3	1 tula and above	Quantity as mentioned	Quantity as mentioned	Quantity as mentioned

Dravya Samrakshana (Raw Drug Storage & Preservation)

गृहीत्वा चानुरूपगुणवद्भाजनस्थान्यगारेषु प्रागुदग्द्वारेषु निवातप्रवातैकदेशेषु नित्यपुष्पोपहारबलिकर्मवत्सु, अग्नि- सालोष्वेद- धूम- रजो- मूषक- चतुष्पदामनभिगमनीयानि स्ववच्छन्नानि शिक्येष्वासज्य स्थापयेत।। (Cha. Sa., K. St, 1/11)

The collected drugs should be stored in such a container that there should not be any untoward reaction between the drug and container. These containers should be placed in the racks which is in north or eastern part of the storage room. This should be closed from all the sides except one side for ventilation and in that side auspicious rituals are being performed like offering flowers, bali karma (Sacrifice). The place should be well protected from fire, water, moisture, smoke, dust, Rodents like rats, quadruped animals. The mouth of the vessel should be covered with proper lid and well protected.

Rasadi Panchaka (Rasa, Guna, Veerya, Vipaka and Prabhava)

The knowledge of Rasa, Guna, Veerya, Vipaka and Prabhava of the drugs are very much essential while preparing the medicine. The proper combination of these Rasapanchaka enhances the therapeutic action of the drug by their synergetic action. If they are antagonistic, the desired therapeutic effect will not be there and sometimes even it may cause adverse drug reaction. Hence the knowledge of Rasapanchaka is very much essential for those who are working in a production unit.

1. Anukta Visheshokta Paribhasha

In Ayurvedic classical text books while explaining the process of the preparation of medicine sometimes the process, time of administration, dosage, bhavana dravya etc are not specified in the references. In such condition the methods to be adopted are explained as Anukta and Visheshokta Paribhasha.

कालेअनुक्ते प्रभातं स्यात् अङ्गे अनुक्ते जटा भवेत्। भागे अनुक्ते तु साम्यं स्यात्पात्रे अनुक्ते च मृन्मयम्।।
द्रवे अनुक्ते जलं ग्राह्यं तैले अनुक्ते तिलोद्भवम्। एकमप्यौषधंयोगेयस्मिन्यत्पुनरुच्यते।।
मानतोद्विगुणंकार्यंतद्द्रव्यंत्वदार्शभिः।। चूर्ण्स्नेहासवालेहाः प्रयाशः श्वेचचन्दनान्विताः।
कषायलेपयोः प्रायोयुज्यतेरक्तचन्दनम्।। (Sha. Sam Pra. Kha, ¼7-50)

द्रवकार्येऽपिचानुक्तेसर्वत्रसलिलंस्मृतं। (Cha.Sa., K. St. 12/100)

S.No.	If not specified	To be considered
1	Kala (Time)	Prabhata (Early morning)
2	Anga (Part of the Plant)	Jata (Root)
3	Bhaga (Quantity of ingredients in a compound formulation)	Samya (Equal Quantity)
4	Patra (Vessel)	Mrinmaye (Earthen vessels)
5	Drava (Liquid)	Jala (Water)
6	Taila (Oil)	Tilodbhavam (Tila Taila-Sesame Oil)
7	Ksheera	Goksheera (Cow's Milk)
8	Ghrita	Goghrita (Cow's Ghee)
9	Mutra	Gomutra (Cow's Urine)
10	Lavana	Saindhava lavana (Rock salt)

Visheshokta Paribhasha

अतिस्थूलजटा याः स्युस्तासां ग्राह्यास्त्वचो बुधैः।। गृहीयात्सूक्ष्ममूलानि सकलान्यपि बुद्धिमान्।
न्यग्रोधादे स्त्वचो ग्राह्याः सारः स्याद्बीजकादितः।। तालीसादेश्च पत्राणि फलं स्यात्त्रिफलादितः।
घातक्यादेश्च पुष्पाणि स्नुह्यादेः क्षीरमाहरेत्।। (Sha. Sam Pra. Kha. 1/60-62)
यतश्च पादनिर्देशः चतुर्भागः ततश्च सः।। (Cha.Sa., K. St. 12/100)
द्रव्यप्रमाणंतुयदुक्तं अस्मिन्नध्येषुतत्कोष्ठवयोबलेषु।
तन्मूलमात्रम्ब्यंभवेद्विकल्प्यंतेषां विकल्पोऽऽश्यधिकोनभावः। (Cha. Sa., K. St. 12/86)
चूर्णस्नेहासवा लेह प्रायशश्चन्दनान्विताः।। कषायलेपयोः प्रायो युज्यते रक्तचन्दनम। (Sha. Sam Pra. Kha. 1/
एकमप्यौषधं योगे यस्मिन्यत्पुनरुच्यते। मानतो द्विगुणं प्रोक्तं तद् द्रव्यं तत्त्वदर्शिभिः।। (Sha. Sam Pra. Kha. 1/
व्याधेरयुक्तं यद् द्रव्यं गणोक्तमपि तत्त्यजेत्। अनुक्तमपिय द्युक्तं योजयेत्तत्र तद्बुधः।। (Sha. Sam Pra. Kha. 1/

S.No.	Special Consideration	To be considered
1	Atisthoola Jata (Big Roots)	Moola Twak (Root bark)
2	Sookshma moola (Small roots)	Moola (Whole root)
3	Nyagrodadi ksheeri vriksha (Pancha valkala)	Khanda Twak (Stem bark)
4	Beejaka, Chandana, Devadaru etc	Sara (Heart wood)
5	Talisa, Tulasi, Nagavalli, Kumari etc	Patra (Leaves)
6	Haritaki, Bibhitaki, Amalaki, Kushmanda, Karavellaka etc	Phala (Fruit)
7	Dhataki, Lavanga, Taruni	Pushpa (Flower)
8	Snuhi, Arka,	Ksheera(Latex)
9	Padavashesha	Reduction of the liquid to $\frac{1}{4}^{th}$ part
10	Dravya Pramana (Dosage of the Preparation)	Middle aged person having moderate built and digestive capacity
11	Chandana for the preparation of Choorna, Sneha, Asavarista, Avaleha	Sweta Chandana (White Sandal wood)
12	Chandana for Kashaya and Lepa	Rakta Chandana (Red Sandal wood)
13	If a drug is mentioned two times in a preparation	Double quantity should be taken
14	Deletion or addition of the drug	Considering the condition of roga and rogi, physician can delete or add the drug in a compound preparation

2. Aushadha Namakarana

In Classical text books we find thousands of compound preparations. These preparations are named based on certain criteria like the first drug of the formulation Action, Dose, number of ingredients etc.

a. First ingredient in the formulation
   Eg :- 1. Talisadi Choorna, 2. Sitopaladi Choorna, 3. Punarnavastaka Kwata etc.
b. Rogadhikara (Main Indication)
   Eg :- Jwarankusha Rasa, Swasakutara Rasa, Swasakasa chintamani, Amavatari Rasa etc.
c. Important Ingredient of the formulation
   Eg :- Dashamoolarista, Arjunarista, Hinguleshwara rasa, Hingwastaka choorna etc.
d. Name of the person who formulated
   Eg :- Chyavanaprashavalehya, Agastyaharitaki lehya etc.
e. Therapeutic action of the formulation
   Eg :-Arogyavardhini vati, Arshakutara Rasa, Grahani kapata rasa
f. Based on the appearance
   Eg :- Rasamanikya, Swarnavanga
g. Based on the therapeutic dose
   Eg :- Shadbindu taila, Kamsaharitaki lehya
h. Time of collection of the drug
   Eg :- Pushyanuga Choorna
i. Method of Preparation
   Eg :- Shatadhouta Ghrita, Sahasradhouta ghrita, Putapakwa vishamajwarantaka louha
j. Based on the fame of the preparation
   Eg :- Tribhuvanakeerti Rasa, Trivikrama rasa, Trailokyachintamani Rasa
k. Based on similies
   Eg :- Kamadhenu Rasa, Kanakasundara rasa

3. Aushadha Sevana Kala (Time of Drug Administration)

In Ayurvedic therapeutics equal importance have given to the Oushadha, Dosage form and time of administration. Time of administration is mentioned in relation with Ahara sevana by all the Acharyas. There are differences of opinion regarding the number of Oushadha sevana kala.

भैषज्यकालो भुक्तादौ मध्ये पश्चान्मुहुर्मुहुः । समुद्गं भक्तसंयुक्तं ग्रासग्रासान्तरे दश ।। (Cha. Sam Chi. St. 30/298)

S.No.	Bheshaja Kala	Description
1	Bhaktadou-1	Before morning food
2	Bhaktadou-2	Before evening food
3	Madhye	In the midst of the food

4	Paschat-1	After Morning food
5	Paschat-2	After Evening food
6	Muhurmuhuhu	Frequently
7	Samudga	Before and after food
8	Bhaktasamyuktam	Mixed with food
9	Grasa	Mixed with each bolus of food
10	Grasantara	In between two boluses

तन्त्राभक्तं प्राग्भक्तम् अधोभक्तं मध्येभक्तम् अन्तराभक्तं सभक्तं सामुद्ग मुहुर्मुहुः ग्रासं ग्रासान्तरं च इति दशौ
ाकालाः।। (Su. Sam. U. St. 64/65)

S.No.	Bheshaja Kala	Description
1	Abhakta	In empty stomach
2	Pragbhakta	Before food
3	Adhobhakta	After food
4	Madhyebhakta	In the midst of the food
5	Antarabhakta	In between the two meals
6	Sabhakta	Mixed with the food
7	Samudga	Before and after food
8	Muhurmuhuhu	Frequently
9	Grasa	Mixed with each bolus of food
10	Grasantara	In between two boluses

तद्यथा अभक्तं, प्राग्भक्तं, मध्यभक्तं, अधोभक्तं, सभक्तं, अनन्तरभक्तं, सामुद्गं, मुहुर्मुहुः सग्रासं, ग्रासान्त
निशि च।। (A. San, Su. St 23)

युञ्ज्यादन्नमन्नादौ मध्येऽन्ते कवलान्तरे। ग्रासेग्रासेमुहुः सान्नं सामुद्गं निशि चौषधम्।। (A. Hri, Su. St 13/37)

S.No.	Bheshaja Kala	Description
1	Abhakta	In empty stomach
2	Pragbhakta	Before food
3	Adhobhakta	After food
4	Madhyebhakta	In the midst of the food
5	Antarabhakta	In between the two meals
6	Sabhakta	Mixed with the food
7	Samudga	Before and after food
8	Muhurmuhuhu	Frequently

9	Grasa	Mixed with each bolus of food
10	Grasantara	In between two boluses
11	Nishi	Night

ज्ञेयः पञ्चविधः कालोभैषज्यग्रहणेनृणाम्। किञ्चित्सुर्योदयेजातेतथादिवसभोजने।।
सायन्तनेभोजनेचमुहुश्चापितथानिशि। (Sha. Sam Pra. Kha, 2/2-3)

S.No.	Bheshaja Kala	Description
1	Suryodaya	Early morning during sun rise
2	Divasabhojana	First Annakala (Morning)
3	Sayam bhojana	Second Annakala (Evening)
4	Muhurmuhuhu	Frequently.
5	Nishi	Night

These Bhaishajya kala has its own significance depending upon the dosha involved, disease, for shodhana purpose etc., The detailed explanation of these Bhaishajya kala can be understood as follows

1. Abhakta

व्यानेतुप्रातरशितं।। (Cha. Sam, Chi. St, 30/299)

Drug is administered early morning in empty stomach is known as Abhakta. It is indicated in Vyana vayu vikruti.

तत्राभक्तंतुयत्केवलमेवौषधमुपयुज्यते। वीर्याधिकंभवतिभेषजमन्नहीनंहन्यात्तथाऽऽमयमसंशयमाशुचैव।
तद्बालवृद्धवनितामृदवस्तुपीत्वाग्लानिंपरांसमुपयन्तिबलक्षयंच। (Su. Sam. U. St, 64/69)

The Veerya of the drug administered in Abhakta kala becomes more potent in the absence of food and cures the disease promptly. Drugs should not be administered in Bala, Vriddha, Vanita and mridu personality in order to avoid Glani and Bala kshaya.

प्रायः पित्तकफोद्रेके विरेकवमनार्थयोः। लेखनार्थं च भैषज्यं प्रभाते तत्समाहरेत्।।
भैषज्यमभ्यवहरेत्प्रभाते प्रायशो बुधः। कषायांश्च विशेषेण तत्रभेदस्तुदर्शितः।। (Sha. Sam Pra. Kha, 2/1)

As per Sharangadhara, Suryodaya can be compared to Abhakta, Drugs are administered for Pitta kaphodreka, Virechana, Vamana and Lekhana purpose. Usually Kashayas can be administered in the same kala.

यत्राहारेजीर्णभेषजं, भेषजेजीर्णेचाहारः तत् अनन्नम् अभक्तंनाम। (A. Hri, Hemadri)

Hemadri mentioned this kala as Ananna. Here the drug is administered in empty stomach early morning after the complete digestion of the previous night food.

2. Pragbhakta

प्राग्भक्तं नाम-यत्प्राग्भक्तस्योपयुज्यते। शीघ्रंविपाकमुपयातिबलंनहिंस्यादन्नावृतंनचमुहुर्वदनान्निरेति।
प्राग्भक्तसेवितमथौषधमेतदेवदद्याच्चवृद्ध-शिशु-भीरु-कृशाङ्गनाभ्यः।। (Su. Sam. U. St, 64/71)

Pragbhakta is the administration of drug before food. Here the drug gets dige easily and doesn't cause any harm to the strength, doesn't cause Chardi. It is indic in Children, Geriatric people, frightened person and very lean persons.

प्राग्भक्तंनामयदनन्तरभक्तम्। तदपानानिलविकृतावधः कायस्यचबलाधानार्थंतद्गतेषुचव्याधिषुप्रशमनयकृशीक
र्थंचयोज्यम्। (A. Sam. Su. St 64/14)

Drugs administered in Pragbhakta is indicated in Apana vayu vikruti. It g strength to Adhah Kaya(lower limbs), diseases of the lower limbs, and Krishikar (Vajikarana).

3. Adhobhakta

अधोभक्तं नाम-यद्धोभक्तस्येति। पीतंयदन्नमुपयुज्यतदूर्ध्वकाये, हन्याद्गदान्बहुविधांश्चबलं ददाति।
(Su. Sam. U. St, 64

The drug administered after the food is called Adhobhakta. It is indicated for diseases of Urdhwa jatru vikaras (Head and Neck). It helps to gain strength of the bo

अधोभक्तं भक्तादनन्तरम्। तत्तु व्यानविकृतौ प्रातराशान्तमुदानविकृतौ पुनः सायमाशान्तम्पूर्वकयस
लाधानार्थतद्गतेषुव्याधिषु च श्लेष्मिकेषु च प्रशमायस्थूलीकरणार्थंच। (A. Sam, Su. St 23/16)

Drugs should be administered after the food in the morning and evening in vya and Udana vayu vikruti respectively. It is also indicated in strengthening and in diseases of adhakaya, Kaphaja vyadhis and for the brimhana purpose.

4. Madhye bhakta

मध्येभक्तं नाम- यन्मध्येभक्तस्यपीयते। मध्ये तु पीतमपहन्त्यविसाभिभावाद्ये मध्यदेहमभिभूयभ्वन्तिरोगः।।
(Su. Sam. U. St, 64/

The Drug administered in the middle of the food is known as Madhye Bhak It is indicated in Samana vatavikara, Pittaja vyadhi, Diseases of the Madhya sharee (Kosthagata vikaras).

समाने मध्यभोजनम्। (Cha. Sam, Chi. St, 30/299)

Madhye Bhakta bheshaja kala is indicated in Samana vata Vikara.

5. Antara bhakta

अन्तराभक्तं नाम-यदन्तरापीयते पूर्वापरयोर्भक्तयोः। हृद्यं मनोबलकरं त्वथदीपनं च पथ्यं सदा भवति चान्तरभक्त
यत्। (Su. Sam. U. St, 64/77)

Drugs administered in between the two meals after the digestion of the mornin meals. It acts as Hridya, increases mental stability, deepana and pathya.

अन्तराभक्तं यत्पूर्वनिभक्ते जीर्णेमध्याह्ने भेषजमुपयुज्यते, तस्मिंश्चजीर्णे पुनरपरानेभोजनम्। तदीप्ताग्नेव्यानजेष्वामयेषु।

(A. Sam, Su. St 23/18)

Drugs administered in between the two meals after the digestion of the morning meals. It acts as Deepana and indicated in vyana vayu vikara.

6. Sabhakta

सभक्तं नामयत्सहभक्तेन।। पथ्यं सभक्तमबलाबलयोर्हि नित्यं, तद्वद्वेविणामपि तथा शिशुवृद्धयोश्च।

(Su. Sam. U. St, 64/76-77)

The Drugs administered along with the food is called Sabhakta. It is indicated in Children and Geriatrics. Pathya oushadhis are administered along with foods.

सभक्तं यदन्नेन समंसाधितं पश्चाद्वासमालोडितम्। यद्बालेषुसुकुमारेष्वौषध द्वेषिष्वरुचौ सर्वांगगेषु च रोगेषु।

(A. Sam, Su. St 23/17)

The drug is administered mixed with the food or the food is prepared using the drugs is called Sabhakta It is indicated in bala (children), Sukumara (Delicate), those who are having aversion for food and Sarvanga Vikara.

7. Samudga

सामुद्गं नाम-यद्भक्तस्यादावन्ते च पीयते।। दोषेद्विधाप्रविसृते तु समुद्गसंज्ञमाद्यन्तयोर्यदशनस्य निषेव्यते तु।

(Su. Sam. U. St, 64/79)

लघ्वल्पान्नयुक्तं पाचनावलेह चूर्णादि हिध्मायां कम्पाक्षेपयोरुध्वयस्संश्रये च दोषे। (A. Sam, Su. St 23/19)

Drugs are administered just before and after the meal is called Samudga. Usually Pachana oushadhis, Avaleha, Choorna and Laghu guna drugs are administered. It is indicated in Hikka, Kampavata, Akshepaka, Urdhwa and Adhah shareera rogas.

8. Muhurmuhuhu

मुहुर्मुहुनाम-सभक्तमभक्तं वायदौषधं मुहुर्मुहुरुपयुज्यते।। श्वासे मुहुर्मुहुरतिप्रसृते च कासे, हिक्कावमीषुसवदन्त्युप-योज्यमेतत। (Su. Sam. Su. St, 64/81)

मुहुर्मुहुस्तुपुनः पुनर्भुक्ते यदभुक्ते वा। तच्छ्वास कास हिध्मा तृट् छर्दिषु विषनिमित्तेषु च विकारेषु। (A. Sam, Su. St 23/20)

Drugs are administered in a specific time interval again and again. It is Indicated in Swasa, Kasa, Hikka, Chardi and Visha vikaras.

9. Sagrasa

ग्रासं तु यत्पिण्डव्यामिश्रम्। ग्रासेषुचूर्णबलाग्निषु दीपनीयं, वाजीकराण्यपि तु योजयितुं यतेत।

(Su. Sam. U. St, 64/84)

सग्रासं यत्ग्राससम्पृक्तम्। तथा सग्रासं चूर्णलेहवटकादिकमग्निदीपनं वाजीकरणानि चोप्युञ्जीत।

(A. Sam, Su. St 23/21)

Drugs are administered along with each bolus of the food. It is indicated in Prana vayu vitiation. The drugs like Agnidepaka, Vajikara, Vati and lehas are administered.

10. Grasantara

ग्रासान्तरं तु-ग्रासान्तरेषु।। (ग्रासान्तरं यदुभयोर्ग्रासयोर्मध्ये प्रयुज्यते। इतिपा.भे.)
ग्रासान्तरेषुचितरेद्वमनीयधूमान्, ग्रासादिषुप्रथितदृङ्गुणांश्चलेहान्। (Su. Sam. U. St, 64/84)
ग्रासान्तरं यद्ग्रासयोर्ग्रासयोर्मध्येद्वयमध्येतत्स्थाणानिलविकृतौ।
ग्रासान्तरंहृद्रोगवमनंधूमञ्च। (A. Sam, Su. St 23/20)

Drugs are administered in between the bolus of food. It is indicated Jatrurdhwa Rogas, Vamaneeya Dhoomapana, Leha in Swasa, hridroga and Pr vayu vikruti.

11. Nishi

वमनं धूमं च जत्रूर्ध्वमियेषु तु निशायाम्। (A. Sam, Su. St 23)
ऊर्ध्वजत्रुविकारेषु स्वप्नकाले प्रशस्यते। (A. Hri, Su. St 13/41)

Drugs are administered at bed time is called Nishi. It is indicated in Jatrurdh rogas, Vamana Dhoomapana, Malakaraka and Virechana.

4. Saveeryata Avadhi (Shelf Life)

Shelf life is the time during which the product, if stored appropriately as per manufacturer's instructions, will retain fitness for use. Shelf life is related with the qual of the drug. In Ayurvedic classics, detailed explanation is available. Sharangadha explained this in Prathama Khanda first chapter.

गुणहीनं भवेद्वर्षादूर्ध्वं तद्रूपमौषधम्। मासद्वयात्तथा चूर्णं हीनवीर्यात्वमाप्नुयात्।।
हीनत्वं गुटिकालेहौ लभेते वत्सरात्परम्। हीनाःस्युः घृत तैलाद्याश्चतुर्मासाधिकात्तथा।।
ओषध्यो लघुपाकाः स्युर्निर्वीर्या वत्सरात्परम्। पुराणाःस्युर्गुणैर्युक्ता आसवा धातवो रसाः।।

(Sha. Sam Pra. Kha, 1/51-5

S.No.	Dravya / Dosage form	According to Sharangadhara	According to Yogaratnakara
1	Raw Drug	1 year	
2	Choorna	2 months	3 months
3	Gutika, Avalehya	1 year	6 months
4	Ghrita, Taila	1 year 4 months (16 months)	1 year
5	Laghupaka oushadhi	1 year	
6	Asava, Arista	Infinite	
7	Dhatu (metallic preparation), Rasa (Mercurial preparation)	Infinite	
8	Swarasa		1 yama-3 hrs
9	Kalka		1 yama-3 hrs

10	Kwatha		1 yama-3 hrs
11	Anjana		3 months

As per CCRAS guidelines

Based on the Gazette of India, Extraordinary, vide number G.S.R 897(E), dated the 24th November, 2015, amendment was done to the Drugs and Cosmetics Rules, 1945, related to the the shelf life or date of expiry of an ASU medicines.

S.No.	Dosage form	Shelf life or date of expiry with effect from the date of Manufacture
1	Anjana	
	a) Anjana made from Kasthaushadhi	1 year
	b) Anjana made from Kasthaushadhi alongwith Rasa/Uparasa/Bhasma	2 years
	c) Anjana made only from Rasa/Uparasa/ Bhasma	3 years
2	Arka	1 year
3	Asava Arista	10 years
4	Avaleha, Khanda, Paka, Guda	3 years
5	Churna, Kwatha Churna, Lepa Churna, Danta Manjan (Churna)	2 years
6	Dhoopana	2 years
7	Dravaka, Lavana, Kshara	5 years
8	Ghrita	2 years
9	Guggulu	5 years
10	Gutika/Vati	
	(I) Gutika or Vati containing Kasthaushadhi alongwith Rasa/Uparasa/Bhasma/Guggulu (including Lepa Gutika and Ghana Vati)	5 years
	(II) Gutika or Vati containing only Kasthaushadhi	3 years
	(III) Gutika/Vati containing only Rasa/Uparasa /Bhasma except Naga, Vanga and Tamra Bhasma	10 years
11	Karna/Nasabindu	2 years
12	Kupipakva Rasayana	10 years

13	Malahara	3 years
14	Mandura-Lauha	10 years
15	Naga Bhasma, Vanga Bhasma and Tamra Bhasma	5 years
16	Netrabindu	1 year
17	Parpati	10 years
18	Pishtiand Bhasma except Naga, Vanga and Tamra Bhasma	10 years
19	Pravahi Kwatha	3 years
20	Rasayoga	
	(I) Rasayoga Containing only Rasa/Uparasa/ Bhasma except Naga, Vanga and Tamra Bhasma	10 years
	(II) Rasayoga Containing Rasa/Uparasa/ Bhasma along with Kasthaushadhi/Guggulu	5 years
21	Sattva (derived from medicinal plant)	2 years
22	Sharkara/Panaka/Sharbat	3 years
23	Shvetaparpati	2 years
24	Taila	3 years
25	Varti	2 years

The Saviryata avadhi is an indicative of 'Best before use date'. This is the time li after which one or more properties of the formulations would have shown considera changes/degradation which can be seen or perceived by the consumers/patients a lead to doubts about the quality of the product and ultimately on its efficacy. Howev if a drug is Avipanna (not influenced by environmental factors) and have its origi Gandha (smell), Rasa (taste), Rupa (physical state), it can be used even it is older o because it may indicate that there is no change in the physical or chemical characte Though Ayurveda has judiciously explained the subjective criteria for the assessm of Virya of a drug, but those are not sufficient to assess the potency. Those paramet described by them in that period were really admirable, scientific, and show th keen observation but in today's era such parameters are not sufficient and hence ne objective parameters for measuring these properties are to be searched out. Packagi and storage conditions should be specific and Anurupa Guna (similar quality) accordi to dosage form and the API which the drug contains so that the unwanted effects these factors be overcome.

In the ancient period when there was no industrialization and Vaidyas themselv used to prepare the drug in small scale for the treatment of their patient and th main objective of formulation, of a drug, was to achieve the desire action rather th secondary mean of palatability or shelf life but in today in the era of globalization a

large scale production, there was need to re-determine the revised stability period of these kinds of Ayurvedic formulations by following a suitable guidelines. Now a days, due to usage of permissible preservatives, development and adaptation of packaging and storage technology by Ayurvedic industries, a need arises to re-study and re-establish the newer ones. So based on Stability and other studies, revision was done for the shelf life of the ASU medicines.

5. Aushadha Matra (Posology)

Posology is the branch of medicine concerned with the determination of appropriate doses of drugs or agents. The therapeutic action of the medicament depends upon the quantity which is administered and the quantity which has got absorbed. It is very much essential to fix the dose of the medicament depending upon the age of the patient, disease etc.

As per Ayurveda there is no fixed dose for all. It depends on many factors, In Sharangadhara Samhita it is explained as

स्थितिर्नास्त्येव मात्राया: कालमग्निं वयो बलम्।। प्रकृतिं दोषदेशौ च दृष्ट्वा मात्रां प्रकल्पयेत्।

(Sha. Sam Pra. Kha, 1/37)

Dose of medicine has to be decided by considering Kala (Season), Agni (Digestive capacity), Vaya (age), Bala (Physical Strength), Prakriti (Body Constitution), Dosha (Taratama bhava of the Doshas) and Desha (Bhoomi and Deha) of the patient.

तत्र सर्वाण्येवौषधानि व्याध्यग्निपुरुषबलान्यभिसमीक्ष्य विदध्यात्। तत्र, व्याधिबलादधिकमौषधमुपयुक्तं तमुपशम्य याधिंव्याधिमन्यमावहति, अग्निबलादधिकमजीर्णं विष्टभ्य वा पच्यते; पुरुषबलादधिकं ग्लानिमूर्च्छामदानावहति संशमनम्; एवं संशोधनमतिपातयति। हीनमेभ्यो दत्तमकिंचित्करं भवति। तस्मात्सममेव विदध्यात्।। (Su. Sam. Su. St, 39/10)

Sushruta while explaining the importance of dose of the drug, mentioned that dose has to be fixed based on Vyadhi, Agni, Purusha and bala of the patient. If the high dose or high potency drug is administered in less severe condition it subsides the disease but causes complications. If Drug is administered when Agnimandhya is present, leads to Ajirna and Vistambha. Apart from these it may also causes glani, murcha and mada if the administered drug is Samshamana. If it is for shodhana, then it causes excessive shodhana.

General Dose According to Sharangadhara

बालस्य प्रथमे मासि देया भेषजरक्तिका।। अवलेहीकृतैकैव क्षीरक्षौद्रसिताघृतैः। वर्धयेत्तावदेकैकां यावद्भवति वत्सरः।। माषैर्वृद्धिस्तदूर्ध्वं स्याद्यावत्षोडशवत्सरः। ततः स्थिरां भवेत्तावद्यावद्वर्षाणि सप्ततिः।। ततो बालकवन्मात्रा ह्रासनीया शनैः शनैः। मात्रेयं कल्कचूर्णानां कषायाणां चतुर्गुणा।। (Sha. Sam Pra. Kha, 6/14-17)

S.No.	Age of the patient	Dose
1	1 month	1 ratti (125 mg)
2	2 months	2 ratti (250 mg)
3	3 months	3 ratti (375 mg)

4	4 months	4 ratti (500 mg)
5	5 months	5 ratti (625 mg)
6	6 months	6 ratti (750 mg)
7	7 months	7 ratti (875 mg)
8	8 months	8 ratti (1 gm)
9	9 months	9 ratti (1 gm 125 mg)
10	10 months	10 ratti (1 gm 250 mg)
11	11 months	11 ratti (1 gm, 375 mg)
12	12 months (1 year)	12 ratti (1 ½ gm)
13	2 years	12 ratti + 1 masha (2 ½ gm)
14	3 years	12 ratti +2 masha (3 ½ gm)
15	4 years	12 ratti + 3 masha (4 ½ gm)
16	5 years	12 ratti + 4 masha (5 ½ gm)
17	6 years	12 ratti + 5 masha (6 ½ gm)
18	7 years	12 ratti + 6 masha (7 ½ gm)
19	8 years	12 ratti + 7 masha (8 ½ gm)
20	9 years	12 ratti + 8 masha (9 ½ gm)
21	10 years	12 ratti + 9 masha (10 ½ gm)
22	11 years	12 ratti + 10 masha (11 ½ gm)
23	12 years	12 ratti + 11 masha (12 ½ gm)
24	13 years	12 ratti + 12 masha (13 ½ gm)
25	14 years	12 ratti + 13 masha (14 ½ gm)
26	15 years	12 ratti + 14 masha (15 ½ gm)
27	16 years to 70 years	12 ratti + 15 masha (16 ½ gm)
28	71 years	12 ratti + 14 masha (15 ½ gm)
29	72 years	12 ratti + 13 masha (14 ½ gm)
30	73 Years	12 ratti + 12 masha (13 ½ gm)
31	74 Years	12 ratti + 11 masha (12 ½ gm)
32	75 years	12 ratti + 10 masha (11 ½ gm)
33	76 years	12 ratti + 9 masha (10 ½ gm)
34	77 years	12 ratti + 8 masha (9 ½ gm)
35	78 years	12 ratti + 7 masha (8 ½ gm)
36	79 years	12 ratti + 6 masha (7 ½ gm)

Dose of Drugs as per Kashyapa

S.No.	Age of the Child	Dose
1	Just born	Badaraphala bijatulya
2	5-10 days	Increase gradually
3	11-20 day	Half badara phala
4	21-30 days	Badaraphala
5	1-2 months	1 ½ badara phala
6	3 months	2 badara phala
7	4 months	Shushka Amalaki pramana
8	5-6 months	Amalaki phala pramana
9	7-8 months	Bigger the Amalaki pramana

Dose as per Sushruta

तत्र मासादूर्ध्वं क्षीरपायाङ्गुलिपर्वद्वयग्रहणसंमितामौषधमात्रां विदध्यात्कोलास्थिसंमितां कल्कमात्रां क्षीरान्नादाय, कोलसंमितामन्नादायेति।। (Su. Sam. Sha. St, 10/43)

S.No.	Age	Dose
1	1 month	1 pinch
2	Ksheerannada	Kolasti
3	Annada	Kola

6. Anupana and Sahapana

अनु पश्चात्सह वा पीयते इत्यनुपानम्। अल्पदोषमदोषं वाऽप्यनुपाने न जीर्यति।। (A.Hri.Su.St. 8/30, Hemadri)
अनु पश्चात्पीयते इति अनुपानम्। अनुपश्चात्वा अनुसाकं पीयते इति अनुपानम्। (Cha.Sam.Su.St. 27/319 chakrapani teeka)
अन्नाद् अनुपश्चात्पीयते इति अनुपानम्। (Su. Sam.Su St 46/419, Dalhana teeka)
अनुपानम् इति अनु पश्चात्पानं तत्। (Sha. Sam, Ma. Kha, 8/4. Adamalla)

Anupana is the liquid administered after or along with the medicine or with the food. In case of alpa dosha, Anupana itself acts as medicine. Some Acharyas claim that anupana and sahapana are one and the same.

Importance of Anupana

यत्किञ्चिदौषधं वैद्यैर्देयं रोगानुपानतः। तत्तदगुणकरं ज्ञेयमनुपान बलादिह।। (Y. R.)

Proper anupana administered along with the medicine will enhance activity of the medicine. This indicates the importance of anupana with the medicine.

Mechanism of Action of Anupana

यथा तैलं जले क्षिप्तं क्षणेनैव प्रसर्पति। अनुपानंबलादङ्गे तथा सर्पति भेषजम्। (Sha.Sam, Ma.Kha. 6/5)

Anupana helps the medicines to spread quickly in the body like the oil spre quickly on water surface.

Benefits of Anupana

अनुपानं हितं युक्तं तर्पयत्याशु मानवम्। सुखं पचति चाहारमाशुधे च बलाय च। (Cha. Sam. Su. St. 27/32

Proper anupana administered along with medicine or Ahara causes Tarpana of shareera quickly, helps in easy digestion, helps to improve the strength of the pers

अथानुपानकर्मगुणान्व्याख्यास्यामः- अनुपानं तर्पयति, प्रीणयति, ऊर्जयति, बृंहयति, पर्याप्तिमभिनिर्वर्तयति, युक्त सादयति, अन्नसंघातं भिनत्ति, मार्दवमापादयति, क्लेदयति, जरयति, सुखपरिणामितामाशुव्यवायितां चाहारस्योपजनयं (Cha. Sam. Su. St. 27/325)

Properly administered Anupana brings Satiation, gratification, energy anaboli (nutrition), feeling of completeness or fullness, it settles down the ingested food, bre down the lump of food, softens, moistens and digests the food and then helps in e and proper transformation and quick absorption of food.

Effect of Ideal Anupana

विपरीतं यदन्नस्यगुणैः स्यादविरोधि च। अनुपानंसमासेन सर्वदातत्प्रशस्यते।। (A. Sam,Su. St. 8/51)

Anupana should be opposite to the properties of the food, and it should not harmful to the body.

Anupana For Different Diseases

स्निग्धोष्णं मारुते शस्तं पित्ते मधुरशीतलम्। कफेऽनुपानं रूक्षोष्णं क्षये मांसरसं पयः। (Cha. Sam. Su. St 27/ 3

स्निग्धोष्णं मारुते पथ्यं कफे रूक्षोष्णमिष्यते। अनुपानं हितञ्चापि पित्ते मधुरशीतलम्।। (Su. Sam. Su. St, 46/4

S.No.	Vyadhi	Anupana
1	Vata roga	Snigdha and Ushna
2	Pitta roga	Madhura and sheeta
3	Kaphaja roga	Ruksha and ushna
4	Kshaya	Mamsa rasa

Anupana and Ahara

तदादौ कर्शयेत्पीतं स्थापयेन्मध्यसेवितम्। पश्चात्पीतं बृंहयति तस्माद्वीक्ष्य प्रयोजयेत्।। (Su. Sam. Su. St, 46/4

Anupana shows different effect when it is administered at different timings of annaka

1. Krishatwa- Beggining of food
2. Samyata- Middle of the food
3. Brihmana- End of the food

Contraindications of Anupana

न पिबेत्श्वासकासार्त्तो रोगे चाप्यूर्ध्वजत्रुगे। क्षतोरस्कः प्रसेकी च यस्य चोपहतः स्वरः।। (Su. Sam. Su. St, 46/4

Anupana is contraindicated in: 1. Swasa; 2. Kasa: 3. Urdhwajatrugata vika 4. Urakshata: 5. Praseka; and 6. Swarabramsha

CHAPTER THREE

Best Anupana Dravyas

सर्वेषामनुपानानां माहेन्द्रं तोयमुत्तमम्। सात्म्यंयस्यतुयत्तोयंतत्तस्यैहितमुच्यते।। (Su. Sam. Su. St. 46/439)
अनुपाने तु सलिलमेव श्रेष्ठं सर्वरसयोनित्वात्सर्वभूतसात्म्यत्वाज्जीवनादिगुणयोगाच्च। (A. Sam. Su. St 10/11)

Among all the anupana, some are considered as best like, Mahendra jala (Rain water), Jala. Apart fron these Asava, Arista, Yusha, Phala swarasa, Kanji, Phalamla, Ksheera, Takra, Madhu, Shitaja, Ushna jala, Mamsa rasa, Oushadha swarasa, Kwatha, Hima, Arka etc.

Sahapana

अर्थ:सन्दर्भश्च: (सहमिलित्वापानम्।) एकत्रमद्यभक्षणम्। तत्पर्य्याय:। सपीति:। (Hemachandra)
तुल्यपानम्। (Amarakosha 2/9/55)
सहपीत:।। (Shabdaratnavali)
यद्योगेन रसादीनां विभक्ता: परमाणव:। द्रुतमंगेषु सर्पन्ति सहपानं तदुच्यते।। (R.T. 6/199)

A Yoga in which Rasoushadies disintegrate into minute particles and quickly absorb and spread in the body is Sahapana. There is no much explanation available about Sahapana. With the available explanation we can conclude that sahapana is liquid administered along with the food or medicine. Some Acharya considered Anupana and Sahapana are one and the same which may be administered along with or after the food or medicine.

Yougika Dravya Siddhanta

विरुद्धवीर्यमाप्येषां प्रधानानामबाधकं। अधिकं तुल्यवीर्ये हि क्रियासामर्थ्यमिष्यते।। (Cha. Sam, Ka. St 12/45)

In a compound preparation, if it is necessary to add the drug having opposite veerya, then the drug should be selected in such a way that it should not hinder or suppress the action of the main drug. Eg. Ela in Madanaphala yoga, Ela alone if it administered acts as an Antiemetic, but if it is an ingredient in Madanaphala yoga it doesn't hinder the action of Madanaphala.

Discussion

Fundamental Principles are the basic principles of any science or Philosophy from which further development happens. Synonyms are basic principles, basics, bedrock, and fundamentals. In Ayurvedic Pharmaceutics basic principles are related to the preparation of medicine, as medicine is the second important pillar for successful treatment. For the preparation of potent medicine, we have to follow these basic principles.

Conclusion

For the preparation of potent medicines, the knowledge of the factors mentioned under Adharabhuta Siddhana (Fundamental Principles) are very much essential.

Extended Learning

- Discuss the application of fundamental principles with classical examples of various kalpas.
- Discuss the Principle and rationality behind the drug collection.
- Define Samskara. Discuss role of Samskara in Ayurvediya Aushadhi Nirmana along with various examples.
- Chrono- Therapeutics.

References

- WHO. 2003; Heron and Maiti, 2010 (1.60)
- GUPTA et al. Shelf life of Ayurvedic dosage forms- Traditional view, current status and prospective need, Indian Journal of Traditional Knowledge, Vol.10 (4), October 2011, pp. 672-677
- GENERAL GUIDELINES FOR DRUG DEVELOPMENT OF AYURVEDIC FORMULATIONS, Vol- 1, CCRAS, Ministry of AYUSH, Govt, of India

MODEL QUESTIONS

Short Answers

- Describe in brief the fundamental principles of Bhaishajya Kalpana.
- Describe the basic principle of Aushadha Nirmana.
- Write a note on Anukta and Visheshokta Dravya ghrahana.
- Explain the method of Drug Collection.
- Method of preservation of the drugs.
- Criteria for Aushadha Namakarana.
- Saveeryata Avadhi of different dosage forms.
- Saveeryata avadhi of different dosage forms as per recent Indian Gazette.
- Explain Aushadha sevana kala.
- Time of collection of different parts of the plant.
- Difference between Anupana and Sahapana.
- Pranija dravya samgraha.

CHAPTER 4

YANTROPAKARANANI – I
(EQUIPMENTS AND MACHINERIES)

PAPER 1

Contents

- Principles involved, currently used yantras, their correlation, utility, and Instruments used in Large scale Production of the Dola Yantra, Valuka Yantra, Puta Yantra, Khalwa Yantra, Patana Yantra, Darvika Yantra, Ulukhala Yantra, Patala Yantra, Kupi Yantra, Arkapatana Yantra, Pithara Yantra, Sharava Yantra, Palika Yantra, Sthali Yantra, Swedana Yantra and Vidyadhara Yantra
- Principle, Instrumentation, Advantages, disadvantages and Utility of Modern Machinery- Grinder, Disintegrator, Pulverizer, Powder Mixer, Mechanical sifter, Ball mill, Granulator, Dryer, Tablet compressing machine, Pills making machine, Coating pan, Polishing pan End runner machine, Edge runner machine, Capsule filling machine, Ointment mixer, Tube filling machine, Sieves & Meshes, Liquid filling machine, Distillation plant, Strip packing machine, Pouch filling machine, Pyrometer

Learning outcome

At the end of this chapter, Students can able to

1. Define the term Yantra and enlist yantras described in classics useful for aushadhi nirmana.
2. Know the pharmaceutical use of modern machines in Ayurvediya Aushadhi Nirmana.
3. Understand the Principles behind construction and working of the classical Yantras used for Ayurvediya Aushadhi nirmana.

Introduction

The processing of Parada, metals and minerals includes different pharmaceutical procedures like Swedana, Bhavana, Marana and many others. These procedures requires unique instruments to serve the purpose of the procedure and to fulfill the specific criteria in order to prepare the best medicine. So our Acharyas had designed special appliances for specific processing which vary in their structure as per the need of the procedure. These appliances used for the different processing of Rasa dravyas for the preparation of standard quality medicine are termed as Yantras.

Definition

रसोपरसलाहोद्या मारणाद्यर्थसिद्धये। यन्त्र्यन्तेऽनेन यस्मात्तु तस्माद् यन्त्रं प्रकीर्तितम्।। (R.T.4/1)

स्वेदादिकर्मनिर्मातुं वार्तिकेन्द्रैः प्रयत्नतः। यन्त्र्यते पारदो यस्मात्तस्माद्यन्त्रमिति स्मृतम्।। (R.R.S.9/2)

Different instruments are designed and used for the purpose of different pharmaceutical operations of parada, metals and minerals like marana, swedana and

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Different instruments are designed and used for the purpose of different pharmaceutical operations of parada, metals and minerals like marana, swedana and

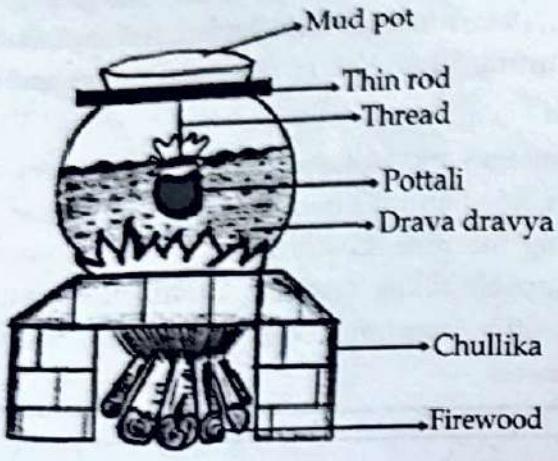
others. These instruments are called Yantras which helps in controlling the pa during its processing.

Many instruments are explained in our classics. Few important instruments

Dola Yantra

द्रवद्रव्येण भाण्डस्य पूरिताधोंदकस्य च। मुखस्योभयतो द्वारद्वयं कृत्वा प्रयत्नतः।।

तयोस्तु निक्षिपेद्दण्डं तन्मध्ये रसपोटलीम्। बद्ध
स्वेदयेदेतद्दोलायन्त्रमिति स्मृतम्।। (R.R.S.9/3-4)



Dola Yantra

An earthen pot is taken and two h are made at its neck region. Pot is filled the required amount of specified liquid an rod or stick is passed through the holes m at the neck region. Dravya which is needed undergo swedana is tied with the cloth made it into pottali with the help of str thread. The other end of the thread is tied the centre of the rod/stick and the pottal made to hang in the centre of the pot, with touching the bottom or side walls of the Then the pot is placed over the fire for heating and dravyas inside the pottali will subjected for swedana. This yantra is known as Dolayantra.

While boiling, the level of the liquid comes down. Then the pot should be fil with specified liquid to maintain the level so that the pottali get completely immers inside the liquid, throughout the procedure of swedana.

Principles Involved

Principle involved is boiling of liquid, through which the swedana process is do Here the word 'Dola' refers to hanging. It has named as Dola yantra because the dr subjecting for shodhana is tied in pottali and made to hang inside the liquid. In th yantra, drava and dravya will be in contact through out the process.

Currently used Yantras and Instruments used in Large scale production

Now a days, the dolayantra as explained in classics are used. Instead of mud p vessels made of stainless steel or other metals are also being used. Steam jacket vessels are used in large scale production.

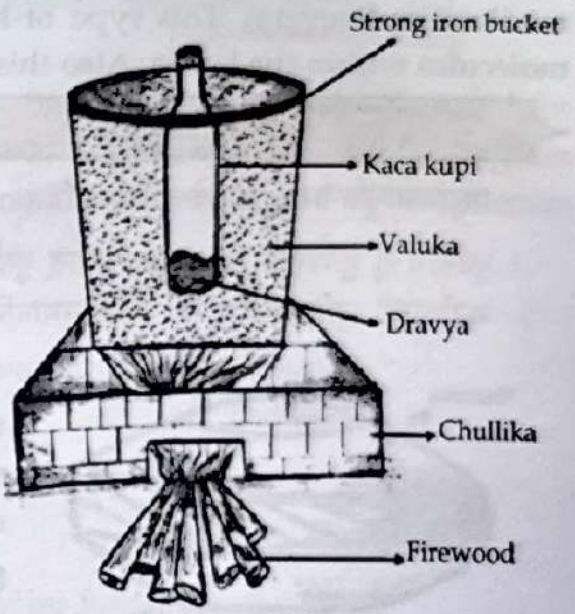
Utility

Dola yantra is used for the swedana and other samskaras of Parada. It is als used for the swedana in the purification of Rasadravyas like Haratala, Shankha an others.

Baluka / Valuka Yantra

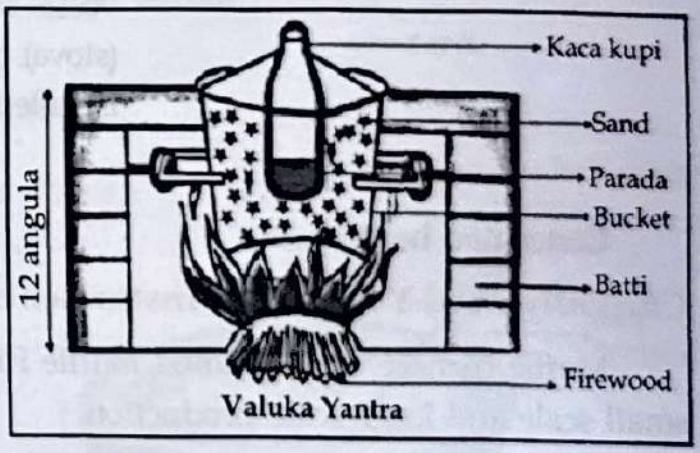
सरसां गूढवक्त्रां मृद्वस्त्रागंङ्गुलसमावृताम्। शोषितां काचकालशीं त्रिषु भागेषु पूरयेत्।।
भाण्डे वितस्तिगम्भीरे वालुकासु प्रतिष्ठिताम्। तद्भाण्डं पूरयेत्तिभिरन्याभिरवगुण्ठयेत्।।
भाण्डवक्त्रं मणिकया सन्धिं लिम्पेन्मृदा पचेत्। चुल्लयां तृणस्य चादाहान्मणिकापृष्ठवः।।
एतद्धि वालुकायन्त्रं तद्यन्त्रं लवणाश्रयम्। षड्भागबालुकापूर्णभाण्डे निक्षिप्य यत्नतः।।
पच्यते रसगोलाद्यं वालुकायन्त्रमीरितम्। (R.R.S. 9/36-39)

A strong elongated glass bottle, the mouth of which is bit constricted is taken and wrapped with mud smeared cloth for 1 Angula thickness. After drying, bottle is filled with the dravyas upto ⅓rd of the bottle. A large earthen or iron tub is taken and filled with sand and bottle containing dravya is placed in the midst of the sand leaving the neck and mouth part of the bottle. Then the vessel is covered with Sharava and joining ends are sealed. The whole apparatus is placed over the fire and required amount and intensity of heat is provided. The heat is given till the dried grass kept on the Sharava get burnt by heat. This yantra is known as Valukayantra. In the same apparatus, if lavana (Salt) is filled instead of sand, then that yantra is called Lavana yantra. 5 Adaka (approximately 2.75 kg) of Sand should be taken in the Valukayantra for heating of Parada and other dravyas.



Valuka Yantra

This yantra can also used without covering its mouth with sharava which facilitates to observe the changes happening inside the bottle and for corking of the bottle.



Valuka Yantra

Principles Involved

Uniform and Controlled temperature with continuous heat flow is the principle involved in this yantra.

Correlation

Sandbath, a laboratory equipment made from a container filled with heated sand used in conjunction with a hot plate or heating mantle to heat it.

Currently Used Yantras and Instruments Used in Large Scale Production

At present, the same Valukayantra is being used, but the heating source h changed to different types of stoves using various fuels. For large scale productio Vertical muffle furnace is used for the preparation of Kupipakwa Rasayanas.

Utility

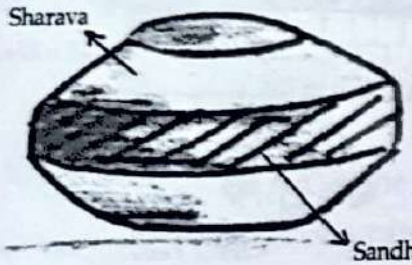
Valukayantra is used in the preparation of Kupipakwa Rasayanas.

Valuka is used in this yantra to provide uniform heating and graded heating (mil medium and severe). This type of heating helps in proper bondage and reactions molecules within the bottle. Also this uniform heating avoids the breakage of the bottl

Puta Yantra

शरावसम्पुटान्तस्थं करीषेष्वग्निमानवित्। पचेच्चुल्ल्यां द्वियामं वा रसं तत्पुटयन्त्रकम्।। (R.R.S.9/42)

पुटनीयं तु कुम्भादौ विन्यस्यावृणुयात् पुनः। पिधानेन दृढेनाथ विदध्यात्सन्धिबन्धनम्।।
करीषाग्नौ चुल्लिकायां वा पचेदग्निमानवित्। लोहादीनां मारणार्थं पुटयन्त्रं प्रशस्यते।। (R.T.4/33-34)



Puta Yantra

Loha and other materials which is to be heate should taken in the sharava or the vessel of th suitable size and shape. Another sharava of same siz or the lid of same size should place over it and th gap between the two is sealed using cloth smeare with mud. Then the sharava samputa or the sealed vessel should be subjected to heat over the chullik (stove) or the pit containing vanopalas. Such yantra is called Puta yantra.

Principles Involved

Concealed heating

Currently Used Yantras and Instruments Used in Large Scale Production

Muffle furnace/Programmed muffle furnace of varying capacity is used both for small scale and large scale production.

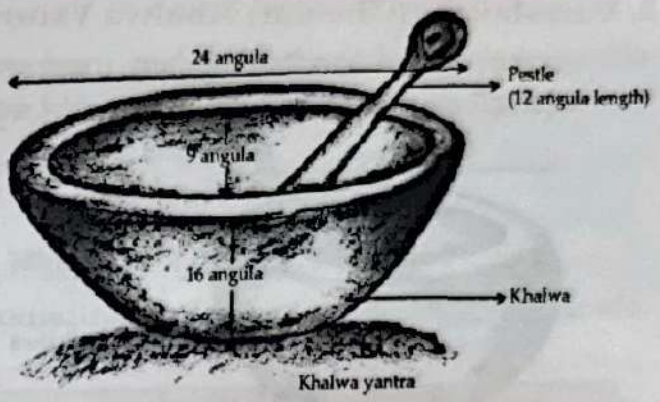
Utility

Puta yantra is used in the preparation of bhasmas.

Khalwa Yantra

Khalwa Yantra is the instrument which is commonly used in processing of different Rasadravyas. They are usually prepared from the stone. They are also prepared with iron, wood, porcelain, agate etc. depending upon the specific purposes. Based on their utility, Khalwa Yantras (Mortar and Pestle) are made of different shape and sizes.

खल्व योग्या शिला नीला श्यामा स्निग्धा दृढा गुरुः।
षोडशांगुलकोत्सेधा नवांगुलकविस्तरा।।
चतुर्विंशांगुला दीर्घा घर्षणी द्वादशांगुला।
विंशत्यंगुलदीर्घा वा स्यादुत्सेधे दशांगुला।।
(R.R.S. 9/78-80)



Khalwa yantra

The stone for the preparation of Khalwa Yantra should be black or bluish in colour, unctuous to touch, strong and heavy in weight. The measurements of mortar should be 16 Angula height, 9 Angula width and 24 Angula length with the 12 Angula long Pestle. Similar stone can also be used for the preparation of Khalwa with the dimensions of 20 Angulas length and 10 Angulas height. Khalwa Yantra with the above mentioned measurements is said to be optimum for the various pharmaceutical processes of Parada.

CHAPTER FOUR

Types

According to Rasa Ratna Samucchaya, Khalwa Yantra is of 3 types.

1. Ardhachandra (Semicircular) Khalwa Yantra
2. Vartulakara (Circular) Khalwa Yantra
3. Tapta Khalwa Yantra

खल्वयन्त्रं द्विधा प्रोक्तं रसतन्त्रे विशेषतः। प्रथमं वर्तुलाकारं द्रोणीरूपं द्वितीयकम्।। (R.T.4/55)

Khalwayantra is of 2 types:

1. Vartulakara (Circular) Khalwa Yantra
2. Dronirupa (Elliptical) Khalwa Yantra

1. Ardhachandra (Semicircular) Khalwa Yantra

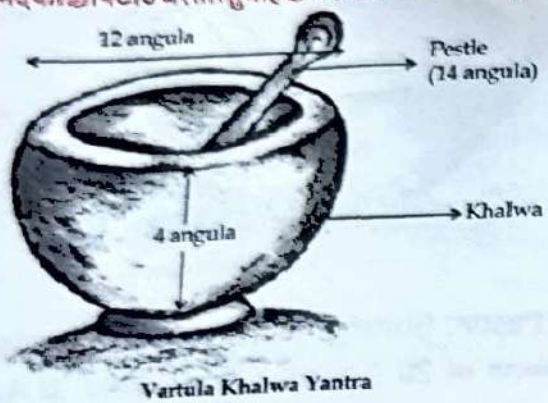
उत्सेधे स दशांगुलः खलु कलातुल्याङ्गुलायामवान्।
विस्तारेण दशाङ्गुलो मुनिमितैर्निम्नस्तथैवाङ्गुलैः।
पाल्यां द्व्यंगुलविस्तरश्च मसृणोऽतीवार्द्धचन्द्रोपमो
घर्षो द्वादशकाङ्गुलश्च तदयं खल्लो मतः सिद्धये।
(R.R.S. 9/83)

Dronirupa Khalwa Yantra

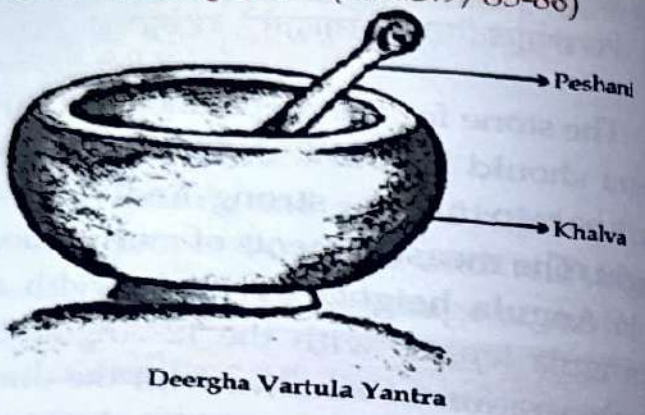
Ardhachandra Khalwa Yantra is prepared with the measurement of 10 Angula height (outer), 16 Angula Length, 16 Angula width, 7 Angula depth (inner) and 12 Angula length pestle. It should be prepared in the shape of semicircular and with soft and smooth inner finishing. This type of khalwa is said to be beneficial for all purposes.

2. Vartulakara (Circular) Khalwa Yantra

द्वादशाङ्गुलविस्तारः खल्लोऽतिमसृणोपलः। चतुरङ्गुलनिम्नश्च मध्येऽतिमसृणीकृतः।
मर्दकाश्रिपिटोऽधस्तात्सुग्राहश्च शिखोपरि। अयं तु वर्तुलः खल्लो मर्दनेऽतिसुखप्रदः। (R.R.S.9/85-86)



Vartula Khalwa Yantra

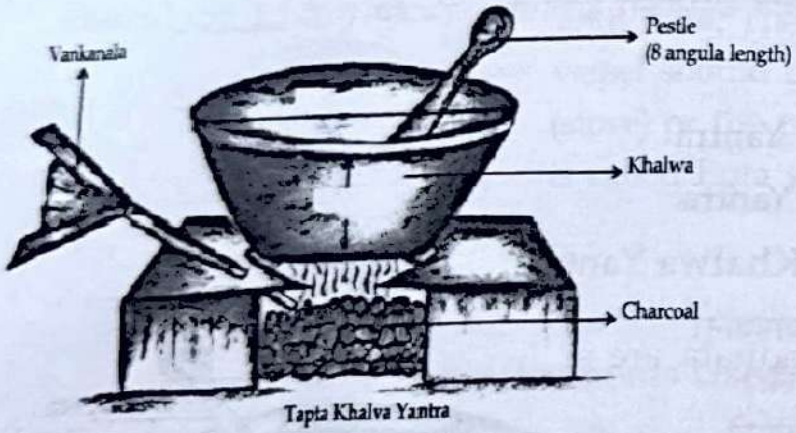


Deergha Vartula Yantra

Vartulakara Khalwayantra is prepared with the dimensions of 12 Angula wi and 4 Angula deep with smooth finishing inside. The pestle should have flat botto and tapering top with hold for proper grip. This type of khalwayantra is more ea for Mardana (Grinding).

3. Tapta Khalwa Yantra

लौहो नवाङ्गुलः खल्लो निम्नत्वे च षडङ्गुलः।
मर्दकोऽष्टांङ्गुलश्चैव तप्तखल्लाभिधोऽप्ययम्। (R.R.S 9/87)



Tapta Khalva Yantra

Tapta Khalwayantra is pre pared by iron (or metal) with th measurements of 9 Angula width 6 Angula depth and 8 Angula lon pestle. This khalwayantra is placed over an iron stand and during trituration, burning charcoal is kept beneath the khalwayantra to provide required amount of heat which assists in the pharmaceu- tical processing. Ajashakrit or Tusha is also used as a fuel to get the temperature of about 60-70°C.

Principles Involved

The principle of attrition and impaction is applied in khalwa yantra. size reduction and homogenous mixing is done by peshani (pestle) which is moving horizontally against the contents in the khalwa yantra.

Correlation

Mortar and pestle

Currently Used Yantras and Instruments Used in Large Scale Production

Currently, Khalwas made of stone, Porcelain, metals are used. For large scale production, Grinder, Powder mixer, Mechanised khalva, Edge runner mill, End runner mill are used.

Utility

रसोपरसलोहादेः पेषणादिककर्माणि। रसतन्त्रक्रियादक्षैः खल्वयन्त्रंप्रयुज्यते।। (R.T. 4/54)

Khalwayantra is used for trituration, pounding and other processing of parada, metals, minerals and herbal drugs.

Patana Yantra

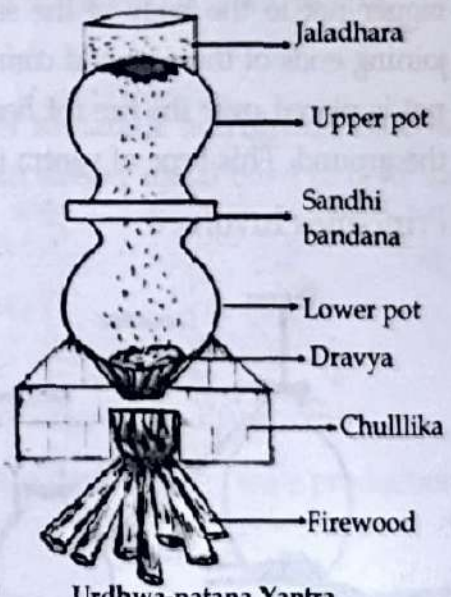
Patana yantra are of 3 types :

1. Urdhwapatana yantra
2. Adhahpatana yantra
3. Tiryakpatana yantra

1). Urdhwapatana Yantra

अष्टाङ्गुलपरीणाहमानाहेन दशाङ्गुलम्। चतुरङ्गुलकोत्सेधं तोयाधारं गलादधः।।
अधोभाण्ड़ं मुखं तस्य भाण्डस्योपरिवर्त्तिनः। षोडशांगुलविस्तीर्णपृष्ठस्यास्ये प्रवेशयेत्।।
पार्श्वयोर्महिषीक्षीरचूर्णमण्डूरफाणितैः। लिप्त्वा विशोषयेत्सन्धिं जलाधारे जलं क्षिपेत्।
चुल्यामारोपयेदेतत्पातना यन्त्रमुच्यते ।। (R.R.S.9/6-8)

A pot having the measurement of 16 Angula wide at its bottom is taken and Toyadhara (to hold the water) is constructed over it with the dimension of 8 Angula breadth, 10 Angula length and 4 Angula height. Another pot, the mouth of which is smaller than the first pot is taken and filled with drayas need to undergo patana. Over this pot, bigger mouth pot is placed inverted, so that the mouth of the lower pot enters the mouth of the upper pot. The joining ends of pots and Toyadhara are sealed with the churna (lime powder), Mandura (Iron oxide powder), Phanita (condensed juice of sugarcane) pasted with buffalo's milk and dried. The whole apparatus is placed over the stove for heating and Toyadhara is filled with cold water. When the water in Toyadhara becomes hot, it is replaced with cold water. This is called Urdhwapatana yantra.



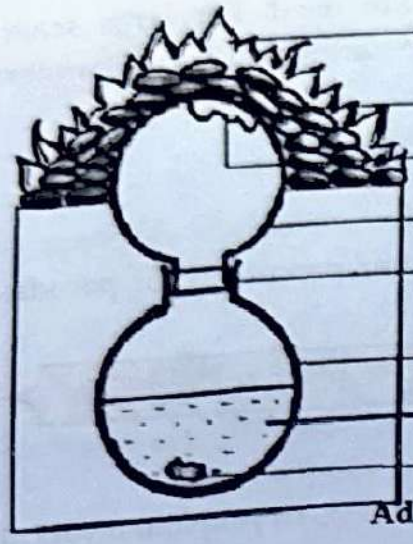
Urdhwa-patana Yantra

2). Adhahpatana Yantra

अथोर्ध्वभाजने लिप्तस्थापितस्य जले सुधीः। दीप्तैर्वनोपलैः कुर्यादधः पातं प्रयत्नतः।। (R.R.S. 9/9)

Two pots of equal size are taken, the mouth of the lower pot is bigger so that the mouth of the upper pot enters into the mouth of the lower pot. The paste of

the medicine is applied to the inner surface of the upper pot and dried. Water is taken in lower pot and the upper pot is placed over the lower pot in such a way that the mouth of the upper pot should be inserted into the mouth of the lower pot. Sandhibandhana is done at the junction of the both the pots. and dried. The apparatus is kept in such a way that ¾th of the apparatus should be inside the ground and cow dung cakes are spread upon the the upper pot and ignited. This yantra is called Adhahpatana yantra.



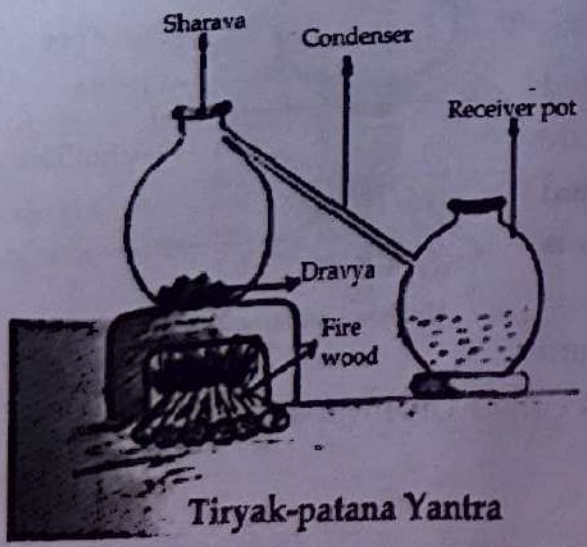
Adhahpatana Yantra

3). Adhahpatana Yantra

क्षिपेद्रसं घटे दीर्घेनताधोनालसंयुते। तन्नालं निक्षिपेदन्यघटकुक्ष्यन्तरे खलु।।
तत्र रूद्धवा मृदा सम्यग्वदने घटयोरथ। अधस्ताद्रसकुम्भस्य ज्वालयेत्तीव्रपावकम्।।
इतरस्मिन्घटे तोयं प्रक्षिपेत्स्वादु शीतलम्। तिर्यक् पातनमेतद्धि वार्तिकैरभिधीयते।। (R.R.S 9/10-12)

A bigger pot of more height and the smaller pot are taken. Bigger pot is filled with Rasa and other dravyas for patana and a tube is connected from the neck region of the bigger pot to the body of the smaller pot. Mouth of both the pots are closed and the joining ends of the pots and connecting portions of the tube are sealed with mud. Bigger pot is placed over the fire for heating and the smaller pot containing water is placed on the ground. This type of yantra is called by the learned scholars as Tiryakpatana yantra.

Principles Involved



Tiryak-patana Yantra

Patanayantra is based on the principle of sublimation and distillation. Here, the vapour scan move in the upward, downward or the sideward direction depending upon the instrument design. Based on this direction, 3 types of patana yantras are designed. In Urdhwapatana yantra Mercury vapours from the lower pot get condensed and deposited at the inner side of the base of the upper pot (beneath the Toyadhara) in the form of droplets by the effect of cold water in Toyadhara. In Adhahpatana yantra, Mercury vapours from the upper pot get condensed and deposited at the bottom of the lower pot containing water. In Tiryakpatana yantra, Mercury vapours from the bigger pot get condensed

and deposited at the bottom of the smaller pot by the effect of cold water present in it.

Correlation

Sublimation and Distillation apparatus

Currently Used Yantras and Instruments Used in Large Scale Production

Now a days Patana yantras as described in classics are used. And also Sublimation and Distillation apparatus of varying sizes are used both for small and large scale production.

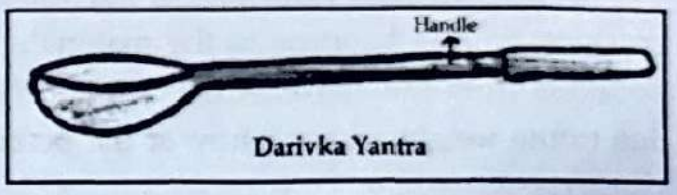
Utility

Patana yantras are used in the extraction of Parada from Hingula. They are also used for the patanasamskara of Parada and Parada samanya Shodhana.

Darvika Yantra

चषकं दर्विकाकल्पं दीर्घहस्तकसंयुतम्। दर्विकायन्त्रमेतद्धि गन्धशोधनसाधकम्।। (R. T.4/39)

Darvika yantra is the apparatus having Chashaka (cup/deeper bowl shaped structure) made up of iron or steel. This Chashaka should be attached with long and strong handle. The whole apparatus is called Darvika yantra.



Darivka Yantra

Principles Involved

Principle involved in designing this apparatus is to handle hot/molten material using its long and horizontal handle, provided with an deeper metal bowl to hold the drugs and heat them to melt.

Correlation

Ladles

Currently Used Yantras and Instruments Used in Large Scale Production

Ladles made up of Iron or steel are being used now a days. In large scale production, bigger ladles and Mechanised ladles are used.

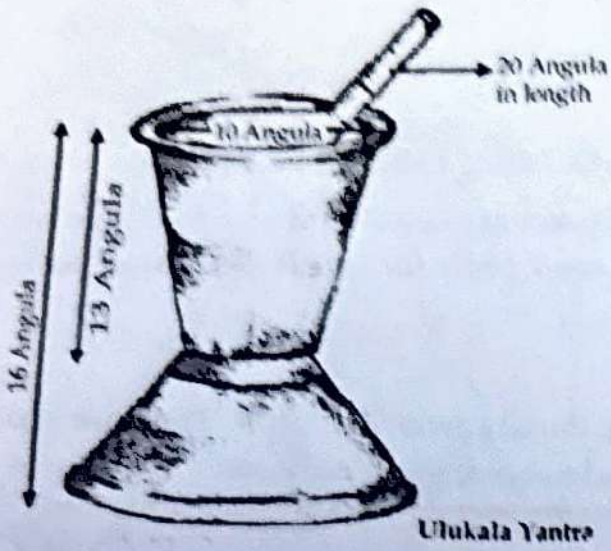
Utility

Darvika yantra is used in melting and purification of Gandhaka and other low melting metals or minerals (Naga, Vanga, Yashada etc.)

Ulukala Yantra

दशाङ्गुलन्तु विस्तारे तूत्सेधे षोडशाङ्गुलम्। त्रयोदशाङ्गुलं चैव निम्नत्वेन च संदृढम्।।
अयसा निर्मितं चैव मध्येऽतिमसृणीकृतम्। विंशत्यङ्गुलदीर्घश्च लोहदण्डः सुशोभनः।।

उलूखलमभिख्यं यन्त्रं बुधैरेतत्प्रकीर्तितम्। ताम्रादीनां कुट्टनार्थं यन्त्रमेतत्प्रयुज्यते।। (R.T. 4/58-60)



Ulukala Yantra

Ulukala yantra should have the measurements of 16 Angulas height, 10 Angulas Diameter and 13 Angulas depth. It should be strong and made up of Iron. It should possess smooth, soft and unctuous finishing in its inner surface. Its pestle should be made up of iron having 20 Angulas length, with soft and beautiful finishing.

Ulukala yantras are also seen which are made up of wood, stone and metals. Small and bigger Ulukala yantras are designed depending upon the requirement and the quantity of drugs needed to be pounded.

Principles Involved

It includes basic principles of particle size reduction namely impact, attrition and crushing. Impact happens to the materials inside the yantra by the peshani which is pounded from the above. Attrition happens by the act of pounding and crushing is due to the weight and pressure of the peshani.

Correlation

Pounding apparatus

Currently Used Yantras and Instruments Used in Large Scale Production

Currently, Pounding apparatus made up of wood, stone or metals are being used Mechanised pounding machines/hammer mills/pulverisers are used in large scale production.

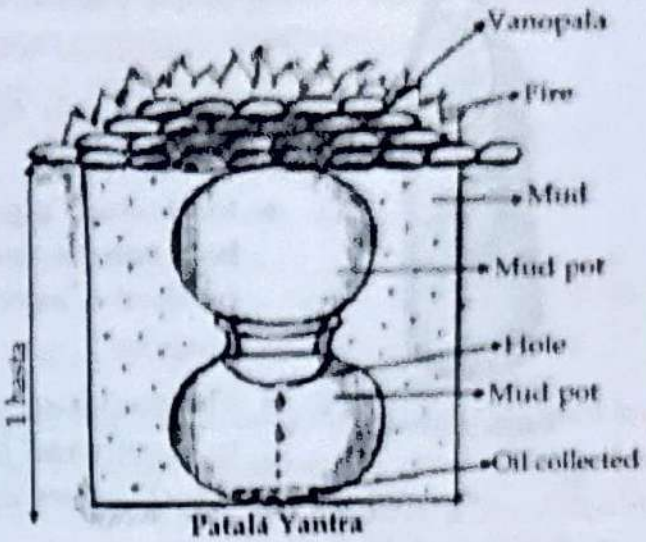
Utility

Ulukalayantra is the apparatus used for pounding tapya and other different mineral and herbal medicinal drugs.

Patala Yantra

भूमौ हस्तमितं निम्नं विदद्याद् गर्तमुत्तमम्। तस्मिन् पात्रं निधायाथ तद्रूपं पात्रमन्यकम्।।
आददीत ततस्तस्मिन्नौषधानि निधापयेत्। आस्यमस्य शरावेण छिद्रगर्भेण रोधयेत्।।
पात्रमेतत्तु गर्तस्थे पात्रे यत्नेन विन्यसेत्। विदध्यादनयोर्यत्नात् सुदृढं सन्धिबन्धनम्।।
मृदा सम्पूर्य गर्तन्तु वह्निं दद्यात् प्रयोगवित्। स्वाङ्गशीतं ततो ज्ञात्वा रसतन्त्रविचक्षणः।।
उपरिस्थन्तु वै पात्रं शनैः समवतारयेत्। अधःपात्रगतं तैलं गृह्णीयात्तु विधानतः।।
एतद् बुधैः समाख्यातं यन्त्रं पातालसंज्ञकम्। आहर्तुं गन्धकादीनां तैलमेतत्प्रयुज्यते।। (R.T. 4/47-52)

A pit is dug for 1 Hastha (18") pramana deep and at its base, a vessel is placed. Another earthen pot or vessel is filled with the dravyas and its mouth is covered with Sharava (earthen saucer) which is having hole at the centre and sealed the joining ends. This vessel is placed inverted over the vessel placed at the base and sealed. Required amount of heat is provided by placing the charcoal or cowdung cakes around the vessel on the ground, ignited. By this heat, oil from the dravyas placed in the vessel extracted out and drop down through the hole in the Sharava and gets collected in the vessel placed at the base of the pit. After self cooling, the upper vessel is taken out and the oil in the vessel at the base of the pit is collected. This yantra is called Patala yantra.



Patala Yantra

Principles Involved

Patala yantra is designed to extract oil by applying heat. Heating is required to extract oil from seeds because it helps to break down the cell walls of the seeds, which makes it easier to extract the oil. Additionally, heating can also help to remove any impurities or moisture that may be present in the seeds, which can improve the quality of the oil. Less oil will be extracted by cold-pressed method, a greater amount remaining in the nut or seed cake. Heat "loosens" the molecular-level bonds between the oils and the surrounding molecules, making it easier for the oils to flow out of the cake. This method can be employed to extract oil from thermo stable substances.

Currently Used Yantras and Instruments Used in Large Scale Production

Thermal oil extraction apparatus is used now a days for small and large scale production.

Utility

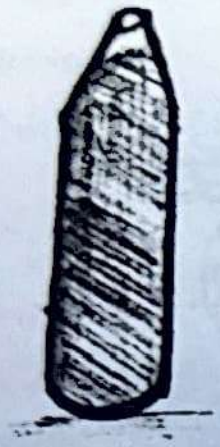
Patala yantra is used in extraction of Gandhaka taila, Bhallataka taila and others.

Kupi Yantra

कूपीइतिकाचकूपी

Kupi refers to the specially designed glass bottle.

Kupi yantra is an instrument where the glass bottle with specific feature is taken and prepared as mentioned below, then filled with kajjali and placed in Valukayantra



Kupi Yantra

for the preparation of Kupipakwa rasayanas. Kupi yantra include the below mentioned steps:-

Preparation of Kupi

- Kupi should be covered with the 7 layers of mud smeared cloth
- Mud which is pandura, krishna or swetha varna which sustains heat can be used. Valmika mrittika or potter's clay can also be used. Generally, at present multani mitti is used for this purpose.
- The mud smeared cloth is wrapped over the kupi from bottom to mouth and should be well dried after each layer. Likewise 7 such layers are wrapped and dried well.

- **Filling of Kajjali into the Kupi:**

  The Kupi is to be filled up to ⅓rd with the Kajjali so that there will be enough space inside the Kupi for the reactions happening inside it.

- **Placing Kupi In Valuka Yantra:**

  Kupi should be kept exactly at the centre of Valukayantra, placed at a height of two Angula from the bottom of Valukayantra and remaining part of the Valukayantra should be filled with sand up to the neck of the Kupi.

Principles Involved

- Specially designed glass bottle is used in the preparation of Kupi yantra to facilitate the condensation and collection of the final product.
- Kupi is covered with the 7 layers of mud smeared cloth to make it suitable to withstand intense heat and becomes more pressure resistant.
- Kupi is filled only ⅓rd part so that there should be free space inside kupi for melting and boiling of kajjali and also for sublimation of compound which is going to condensed and deposited at neck part of the Kupi.
- Kupi is placed at the center part of the Valukayantra so that it will get uniform temperature.

Currently Used Yantras and Instruments Used in Large Scale Production

Currently, the glass bottle as described in classics are being used both for small scale and large scale production.

Utility

Kupi yantra is used in the preparation of Kupipakwa Rasayanas.

Arkapatana Yantra

लघुहस्तः कुलालोऽस्य कुर्याद्यन्त्रं सुनिर्मलम्। यथेष्टां स्थालिकां कुर्यात्त्र्यङ्गुलांग्रान्तसारिकाम्।।५५।।
पृथुब्रघ्नोदराकारां द्व्यङ्गुलां सन्निवेष्टिताम्। सारिकांते तु परिधिं त्र्यङ्गुलोत्सेधशोभिताम्।।५६।।
विनिर्मायाथसार्य्यन्ते यथाशिल्पविनिर्मितम्। छिद्रं कृत्वा नलं दद्याद्गजशुंडासमं सुधीः।।५७।।
सारिकापरिधेरन्तस्तस्य कुर्यात्पिधानकम्। अर्द्धनिम्बूफलसमं परिधेस्तस्य चान्ततः।।५८।।
वदाङ्गुलं मस्तकोर्ध्वं कार्यं तोयस्यधारणे। समर्थां तस्य नलिकां कुर्यात्तोयविमोचनीम्।।५९।।
तस्यैवान्तरतो लेप्या घनाजीर्णास्थिमृत्तिका। अथवा श्वेतकाचं च सर्वदोषापनुत्तये।।६०।।

(Arka Prakasha 1/55-60)

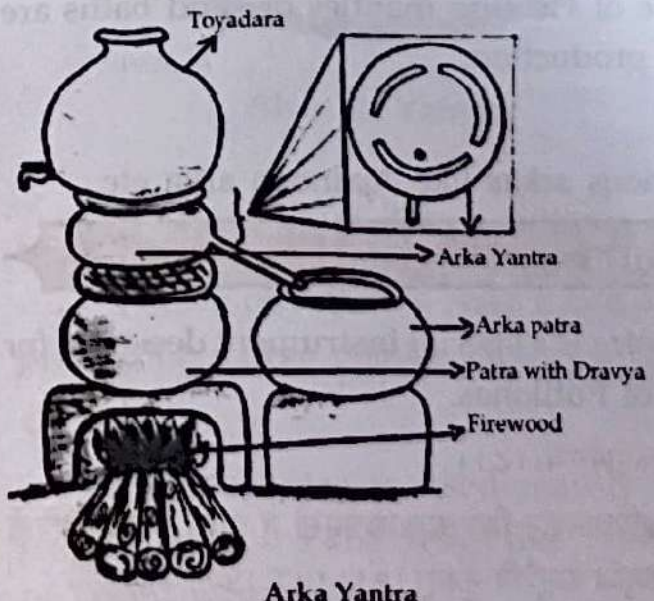
CHAPTER FOUR

Method of Arka preparation according to Arkaprakasha

Comprehensive description about the preparation of various Arka is mentioned in the Arkaprakasha right from apparatus required for Arka preparation, process of Arka preparation, up to the role of agni required, and removal of durgandha from Arka if any. Before invention of modern technique the apparatus for distillation was being prepared.

Ingredients Required

The mud used for the preparation of Arka consists of loha churna (iron powder), Gairika, Alum, Bhrushtamruttika (fried mud), Red clay, Asthibhava mrittika (bone powder), Kachachurna (glass powder), Kikasa raja (Kaseesa), etc. in equal quantities and mixed with equal quantity of panchamutras (Urine of cow, horse, buffalo, goat and elephant), mardana (grinding) is done and then dried in sunlight till the smell of urine get completely lost.



Arka Yantra

Method of Preparing Arkayantra

From the above mrittika round shaped vessel (golakara) has to be prepared by the pot maker. The mouth of the Arkayantra should not be less than 3 angula in size and shape should resemble Surya mandala. Lid of same size is prepared to cover the Arkayantra and there should be lips of 3 Angula by which tight joining can be done with the vessel. Jeernasthi mrittika or white glass powder is used to seal the edges of Arkayantra to make it airtight. One small hole should be made in the lid. In this hole the tube of Bamboo (One is small and another one is double the size of first one) is inserted and clay should be applied at the joints for sealing, so that vapoures may not escape out. The small tube is inserted measuring 4-5 Angula inside

the pot. Arka-patra should be kept below the large tube. Toyadhara must be kept the top of Arkayantra. One more opening with valve (with sealing) is made and sm tube is inserted measuring 4-5 Angula inside the pot at its base so that warm wa can be removed. The vapours that are formed after boiling condenses after coming contact of toyadhara which come out from the pot is collected in the Arkapatra ma up of Jeernasthi mruttika patra, glassware, stoneware, or earthen vessel.

According to Arkaprakasha wood used for burning should be dry but heavy, whic can easily fit in one's fist (size) Ex Khadira or babbula tree bark. During the extraction Arka, gradual increase of temperature is advised for which the author of Arkaprakash mentioned 6 types of Agni that has to be provided accordingly- Dhumagni, Mandag Deepagni, Madhyamagni, Kharagni and Bhatagni.

CHAPTER FOUR

Principles Involved

Simple distillation is the principle involved in this apparatus. This is used t separate liquids from solids or nonvolatile components. Boiling liquids and condensing steam are both processes involved in distillation. In simple distillation, a mixture i heated to change the most volatile component from a liquid into vapor. The vapor rise and passes near the a condenser. Usually, the condenser is cooled (by cold water) t promote condensation of the vapor, which is collected.

Correlation

Distillation apparatus

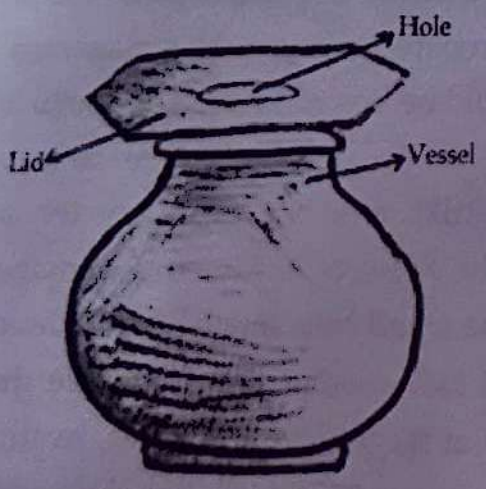
Currently Used Yantras and Instruments Used in Large Scale Production

Distillation apparatus with the heat source of Heating mantles or sand baths ar used at present for small scale and large scale production.

Utility

Arkayantra is used in the preparation various arkas like Ajamoda arka etc.,

Pithara Yantra



Pithara Yantra

Pitharayantra is a special instrument designed fo the Shodhana of Putilohas.

विशुद्धचूर्णोदकपूर्णगर्भे।।८।।

गाढन्तु सच्छिद्रपिधानकेन क्षिपेत्समाच्छन्नमुखे तु कुम्भे। इत्थं निषि भिषजाश्चवारं वङ्गं विशुद्धिं समुपैति नूनम्।।९।। (RT 18-/8-9)

Vanga or any putiloha is taken in an iron ladle melted and poured into lime water through a hole made at the center of the lid placed over the vessel containing the lime water. This process is done for

7 times. The lid with a hole used in this shodhana procedure is called pitharayantra.

Principles Involved

Pitharayantra is designed to make the dhalana procedure safe, thus avoiding chances of getting burnt while pouring the molten puti lohas. Hole in the middle facilitate the pouring of molten metals, whereas the lid makes the content of the vessel intact avoiding any damages.

Currently Used Yantras and Instruments Used in Large Scale Production

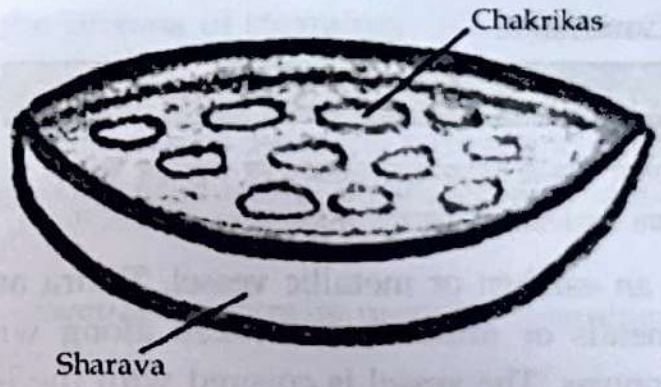
Wooden or metal lid with the hole at its center.

Utility

Pitharayantra is used in the shodhana of Putilohas- Naga, Vanga, Yashada.

Sharava Yantra

Sharava is a shallow dish made of clay. It is basically a container that is used in puta. This earthen ware distinctively used where the temperature rises takes place gently. The size of sharava depends on the procedure under taken and quantity of drugs used for the processing.



Sharava Yantra

Principles Involved

Sharavayantra is designed for the purpose of heating as it can withstand high temperature and remain inert with the drugs used even in high temperature. As sharava is made of clay, it consists of minute pores that porous nature allows heat to circulate easily through it.

Currently Used Yantras and Instruments Used in Large Scale Production

Sharava of different sizes made of mud are being used now a days. In large scale production, Large pots/crucibles are used.

Utility

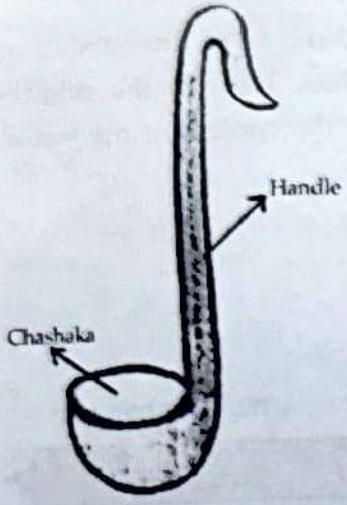
Sharavayantra is used mainly in bhasmikarana process. It is also used for heating or frying the drugs like Tankana, Sphatika etc., and also for the preparation of Triphala masi.

Palika Yantra

चषक वर्तुलं लौहं विनताग्रोर्ध्वदण्डकम्। एतद्धि पालिकायन्त्रं बलिजारणहेतवे।। (R.R.S. 9/50)

A round Chasaka (cup shaped small vessel) of iron is taken and a long rod which

is bent outside at its top is fixed to it which serves as a handle. This yantra is known as palikayantra.



Palika Yantra

Principles Involved

Principle involved in designing this apparatus is to handle hot/ molten materials using its long and vertical handle, with an bent provides a proper grip to hold it. This yantra also equipped with deeper metal bowl to hold the drugs and heat them to melt.

Correlation

Ladles

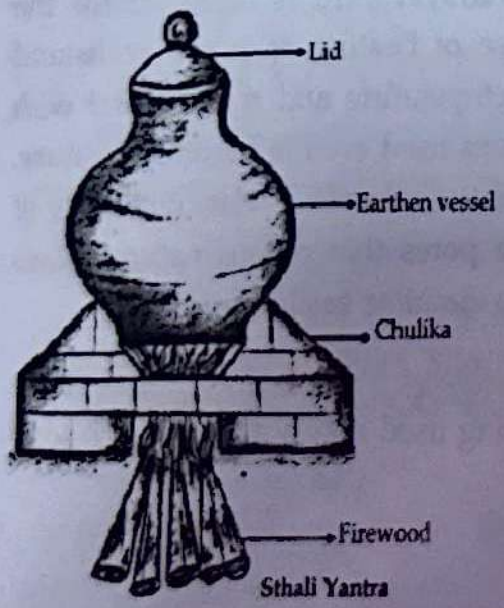
Currently Used Yantras and Instruments Used in Large Scale Production

Ladles made up of Iron or steel are being used now a days. In large scale production, bigger ladles and Mechanised ladles are used.

Utility

Palika yantra is used in the Jarana of Gandhaka.

Sthali Yantra



Sthali Yantra

स्थाल्यां ताम्रादि निक्षिप्य मल्लेनाऽऽस्यं निरुद्धय च।
पच्यते स्थालिकाधस्तात्स्थालीयन्त्रमितम्।। (R.R.S. 9/67)

In an earthen or metallic vessel, Tamra and other metals or minerals are taken along with other dravyas. The vessel is covered with the lid, sealed and kept over the fire for heating. This is called as Sthaliyantra.

Principles Involved

Principle involved is to boil the drugs in closed container in order to do pachana of dhatus.

Correlation

Vessels made of mud or metals

Currently Used Yantras and Instruments Used in Large Scale Production

Vessels of different shape and sizes as per the requirements are used. Jacketed vessels with temperature control are used in large scale production.

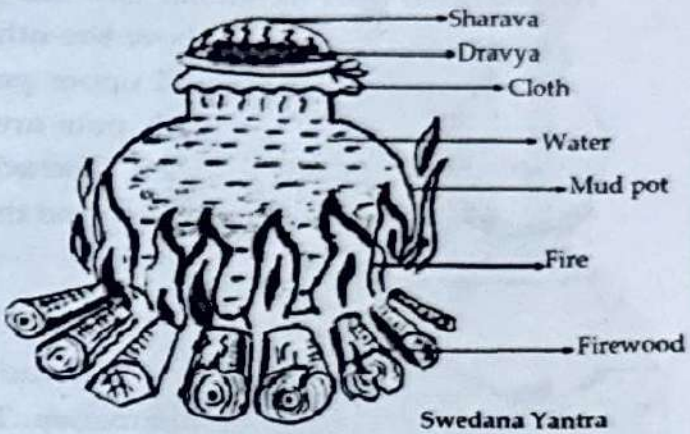
Utility

Sthaliyantra is used for boiling and heating Rasadravyas.

Swedana Yantra

साम्बुस्थाली मुखेबद्धे वस्त्रे पाक्यं निवेशयेत्। पिधाय पच्यते यत्र स्वेदनीयन्त्रमुच्यते।। (R.R.S. 9/5)

A wide mouth vessel is taken and filled with specific liquid. Its mouth is covered and tied with the cloth. Drugs to be steamed is spread over the cloth and inverted sharava or suitable lid is placed over it and sealed. The whole apparatus is placed over the fire and heated. This yantra is called Swedanayantra.



Swedana Yantra

Principles Involved

Swedanayantra is designed with a principle of boiling the liquid and dravya is subjected to swedana process by the steam produced by boiling liquid. In this yantra, drava and dravya will not be in contact and only the steam produced by the boiling drava will make the dravya soft by the process of steaming.

Currently Used Yantras and Instruments Used in Large Scale Production

Now a days swedana yantra and pressure cookers are used for steaming and in large scale production, Steam jacketed vessels are used.

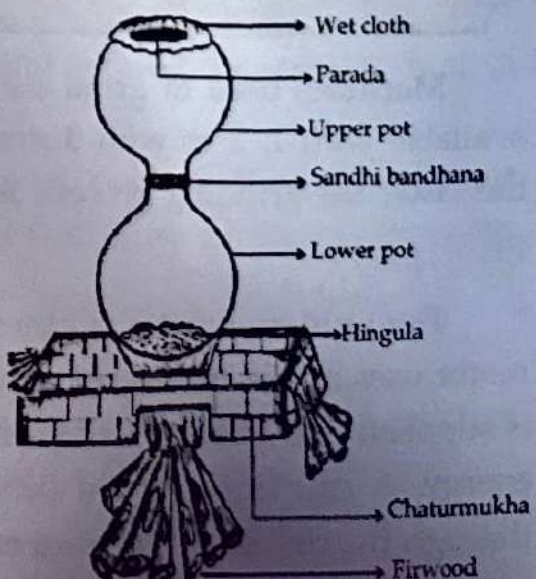
Utility

Swedana yantra is used for steaming of hard and fibrous dravyas for softening of the drugs.

Vidhyadhara Yantra

यन्त्रं विद्याधरं ज्ञेयं स्थालीद्वितयसम्पुटात्।
चुल्लीं चतुर्मुखीं कृत्वा यन्त्रभाण्डं निवेशयेत्।।
तत्रोषधं विनिक्षिप्य निरुन्ध्याद्भाण्डकाकननम्।
यन्त्रं विद्याधरं नाम तन्त्रज्ञैः परिकीर्त्तितम्।। (R.R.S 9/27-28)

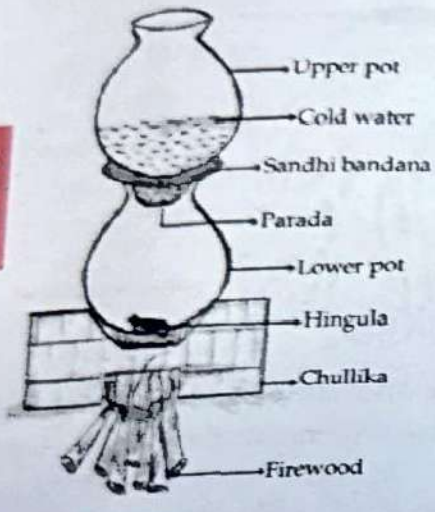
Two earthen pots of similar size are taken upper pot is placed inverted so that its mouth is placed over the mouth of the lower pot. Medicinal drugs are taken in lower pot and joining parts of both pots are sealed with mud smeared wet cloth and dried. The whole apparatus is placed over the unique stove where heat is provided from four sides. This yantra is called Vidhyadharayantra.



Hingulakrista Vidhyadhara Yantra

[स्थालिकोपरि विन्यस्य स्थाली सम्यङ् निरुध्य च। ऊर्ध्वस्थाल्यां जलं क्षिप्त्वा वन्हिं प्रज्वालयेदधः एतद्विद्याधरं यन्त्र हिंगुलाकृष्टि हेतवे ॥ (R.R.S. 9/56)]

Two earthen pots of similar size are taken and placed both vessels up right one above the other. Medicinal drugs are taken in lower pot and upper pot is filled with cold water. Joining parts of both pots are scaled with mud smeared wet cloth and dried. The whole apparatus is placed over the stove for heating and this yantra is called Hingulakrista vidhyadhara yantra.



Principles Involved

Vidhyadhara yantra is based on the principle of sublimation. Here, Mercury vapours from the lower pot get condensed and deposited at the base of the upper pot containing water. Mercury get deposited in the form of droplets by the effect of cold water present in the upper pot.

Correlation

Sublimation apparatus

Currently Used Yantras and Instruments Used in Large Scale Production

Sublimation apparatus

Utility

Vidhyadharayantra is used in the extraction of Parada from Hingula.

Modern Machinery

Grinder

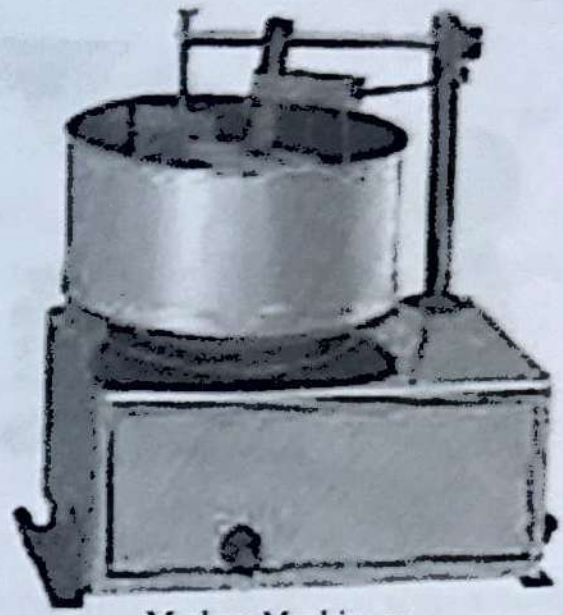
Machines used to grind are called grinders, or grinding machines. Grinders are available with 1, 2 or with 3 stones. Generally, more the number of grinding stones, the faster the grinding process. Again it also depends on size of the stones as well.

Principle

The universal motor is generally used as the drive motor in mixer grinders. This motor uses an electromagnet as its stator to create the magnetic field. When electricity is supplied to a grinder, the motor of the grinder converts electric energy to mechanical energy. A coil is positioned between the magnetic field. Whenever a current flows through the coil, it encounters a magnetic force that causes it to rotate. This mechanical energy rotates the blades of the grinder, which grind the ingredients.

Instrumentation and Working

Wet grinder consists of granite stones which rotate inside a metal drum with the help of an electric motor and the ingredients get crushed between the stone and drum. When the mixer grinder is started, the mortar begins to turn the stones, which moves the ingredients in a circular motion. The circular swirling motion of the mixture creates a vacuum at the center. The central vacuum displaces the contents toward the axis while the whirling motion forces them up on the sides. This helps the ingredients to turn into a smooth paste and a great consistency.



Modern Machinery

Advantages

- They are designed for large grinding. Paste of the ingredients can be made at an ease.
- The stone grinder generates less heat than a mixer and thus it retains the genuine flavor of the drugs after grinding.
- The stones of the Grinder remain sharp for a greater time than the metal blades.
- It also ensures the thorough mixing of all the components.

Disadvantages

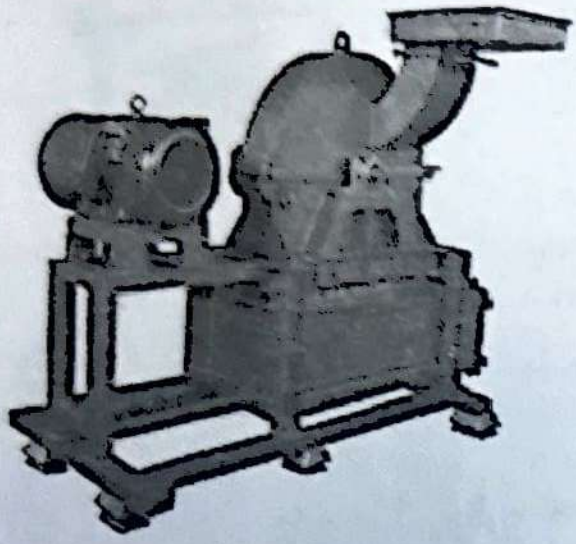
- The Power Consumption is high.
- In the ordinary type, lifting and cleaning the grinding stone poses a problem because of heavy weight.
- Since the grinding vessel is uncovered, it may harbour household pests like cockroaches and get deposited with dust.
- In the tilting model, it takes a longer time to grind because the stone is light in weight.
- There is a possibility of water getting into grinder machine through an outer opening around the grinding vessel. As a result it may cause damage to the inner parts due to rust formation.

Utility

- This machine is used in pharmaceutical industry for grinding and mixing different ingredients, primarily used to mix various drugs of a fine powder.
- Grinder is used to make kalka used in various preparation.

- Grinder is used to give bhavana to the drugs and also to make thick paste to prepare vati.

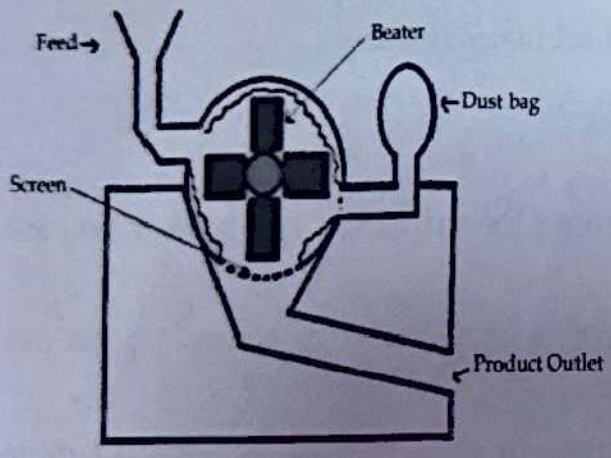
Disintegrator



A disintegrator is a type of crushing equipment used for coarse or fine grinding of materials. The disintegrator is a grinding machine that can be widely applied to various industries including pharmaceuticals. It can perform dry milling or wet milling depending on the application.

Principle

The size reduction in disintegrator is done by impact. Four beaters revolving at high speed inside the machine pulverize material fed into it. The powder thus produced instantly passes through the screens in the lower part of the machine. This free escape of the ground material results in extremely rapid grinding with a fine and cool product.



Disintegrator

Instrumentation

It consists of a steel drum having a shaft in the center. The shaft contains a disc, on which four beaters are fixed. The shaft rotates with a speed of 5000-7000 rev./min. The side and upper inner surface of the drum is rough and undulating. The lower part of the drum has a detachable screen or sieve. The sieve has a definite pore size.

Working

The beaters are mainly responsible for grinding but are helped by undulation of the inner surface and roughness of drum. The material is fed to beaters, through hopper which is fitted to the drum. The material is broken into small particles by impact of the beaters. Due to high velocity of beaters the air velocity inside the chamber is increased. The air is allowed to pass through an outlet on which dust bag is tied, which retains the fine particles of powder.

Advantages

- The particle size of the product is smaller than that produced by any other method of size reduction.
- Expansion of gases at the nozzles leads to cooling, counteracting the usual frictional heat which can affect heat-sensitive materials.
- Since the size reduction is by inter-particulate attrition there is little or no abrasion of the mill and so virtually no contamination of the product.
- For special cases with very sensitive materials it is possible to use inert gases.
- Having a classifier as an integral part of the system permits close control of particle size and of particle size distribution.

Disadvantages

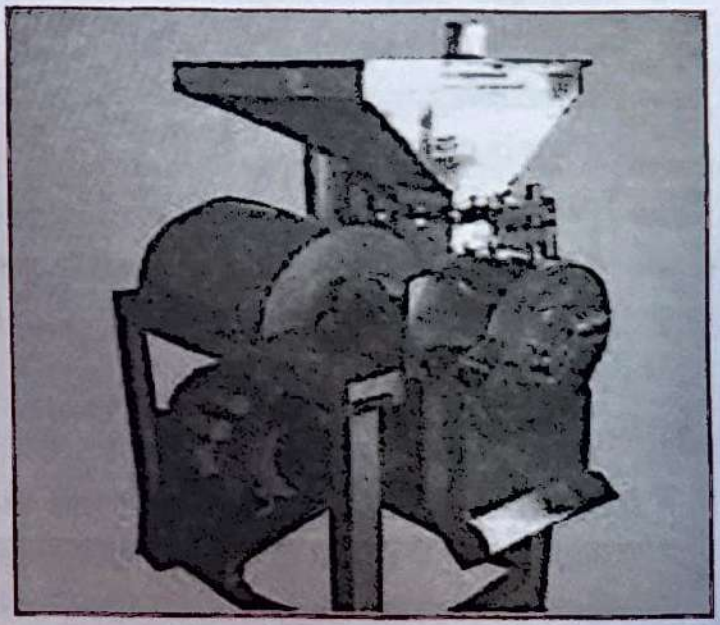
- Possible for jamming of beater if large piece of material enter in it.

Utility

- The mill is used to powder all types of drugs including very hard drugs.
- The mill is used to grind heat sensitive material to fine powder.
- The mill is also used to grind those drugs in which high degree of purity is required.

Pulverizer

A pulverizer is a mechanical device which is used to grind and crush different materials into smaller particles.



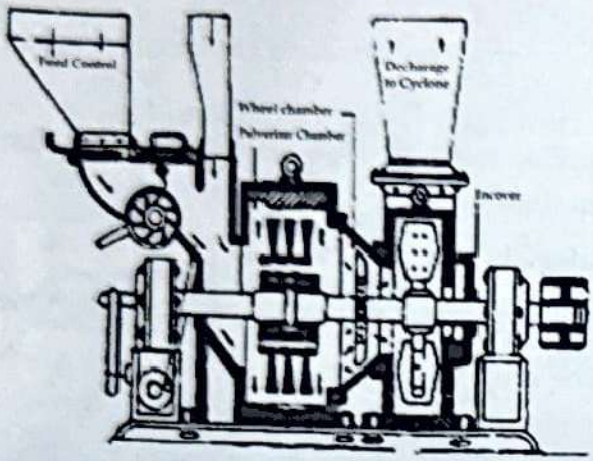
Principle

Pulverizers process materials in batches or continuously by accepting incoming material, often on a conveyor, rotating it and pressing and crushing into it, then sending it out. It uses one, two or all three of the basic principles of particle size reduction namely impact, attrition and crushing.

Instrumentation and Working

Pulverizer consists of various parts like **Hopper / Feeder**, gear driven from the main shaft with feed control mechanism; **crushing chamber; Rotor** mounted on main shaft; **Classifier** with adjustable spider to control fineness of ground powder up to 300

mesh depending on the type of material being pulverized; **Bearings; Hammers; Blower, Cyclone**, dust collector interconnected by dust bags.



When the material is entered into the chamber by the feeding bucket, the material entering the chamber is closely rubbed and strongly impacted on the inner edge of the turbine blade in the rotating air flow, and again lapping in the gap between the blade and the grinding block. At the same time of crushing and grinding the material, the turbine sucked a lot of air, which played the role of cooling the machine, grinding material and transporting fine material: the fineness of the material crushed depends on the nature of the material and the size of the sieve and the amount of material and air. The dust is collected and recycled via cloth bag.

Advantages

- Pulverizers are highly efficient and can process large quantities of materials in short time
- It provides a uniform particle size distribution of required size
- They are easy to maintain and repair, reducing downtime and increasing productivity
- Pulverizers can be used to process wide range of materials including herbal drugs, minerals etc.,

Disadvantages

- Capital cost and operational cost is comparatively high.
- They take up large space and usually requires an isolated room/space for functioning.

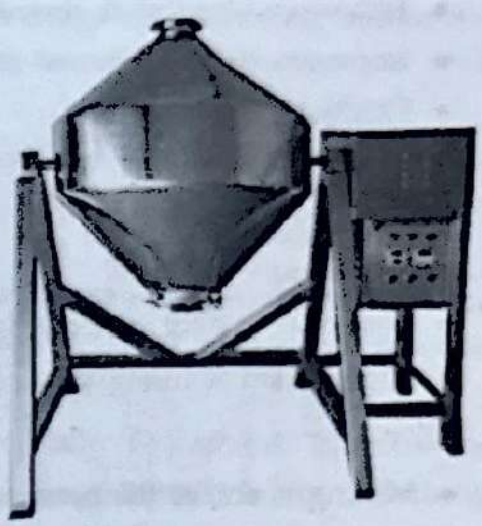
Utility

Pulverizer is used to grind different materials into particles of required size.

Powder Mixer

A powder Mixer is an equipment which does randomization of dissimilar particles within a system. Mixing technologies used in the pharmaceutical industry to blend API (active pharmaceutical ingredients) and additives with uniform particle distribution. But many ingredients in pharmaceutical products are thermolabile and the friction caused by standard mixing technology is a threat to materials. So Mixing equipment for the

pharmaceuticals industry are designed to blend the powders gently without generating excess heat.

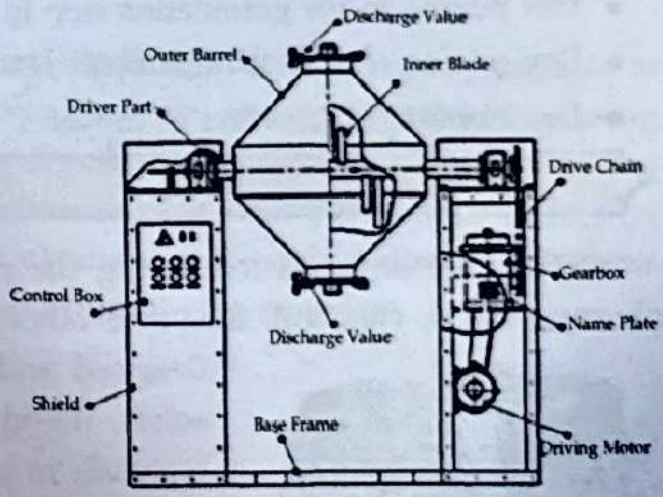


Principle

The principle of mixers is very simple, which usually have two or three multi-hinged blades. When the paddles are in revolution and rotation running at the same time, the material flows up and down as well as around the inner cylinder, which reaches the mixing effect in a very short time.

Instrumentation

Mixing Bowl or blending bowl is in the shape of an Arch and it coordinates free particles into whirling movement with the assistance of an impeller. The bowl is planned in a funnel-shaped structure. It is exceptionally smooth and has no dead corners. **Impeller** is utilized for the homogeneous blending or mixing of the fabric. It is Z-shaped at 36^0 and works in three-dimensional movement. **Chopper** breaks down the larger molecules and change over them into granules. **Discharge port**-The release harbor is balanced on a level plane in a bowl with 45^0 slanted, the granules fabric can totally be expelled.



For the operation of opening and release of the fabric, pneumatic barrels are present. **Liquid binder inlet port** is present in the rapid mixer granulator, by which the binder is added for binding. **Control panel is a** special display system and the timer are present in the control panel.

Working

The working of powder mixers is very simple, which usually have two or three multi-hinged blades. When the paddles are in revolution and rotation running at the same time the material flows up and down as well as around the inner cylinder, which reaches the mixing effect in a very short time.

Advantages

- Besides blending, pharmaceutical mixers perform a range of other processes including dissolving powders and solids, combining raw materials, preparing fine emulsions, particle-size reduction.

- Uniform composition of the mixed components is obtained.
- Enhances physical & chemical reaction of mixed components.
- Improves dissolution and diffusion of mixture.
- Produces dispersion.
- Establish required interaction between drug and the excipients.
- Ensures the quality of the product.

Disadvantages

- Less effective for cohesive/poorly flowing powders
- Segregation is likely to occur if there are significant differences in particle size.

Utility

- Mixing is one of the most common pharmaceutical operation. It is involved in the preparation of many formulation.
- Wet mixing in the granulation step in the production of tablets and capsules.
- Dry mixing of several ingredients ready for direct compression as in tablets.
- Dry blending of powders in capsules, dry syrups and compound powders.

Mechanical Sifter

Sifters are designed for sieving the powder materials and can be used in the pharmaceutical, chemical, food and other industries. Mechanical Sifter is specially designed and developed for separation of solids from solids, liquids from solids and production of graded materials in proportion to their sizes.

Principle

Mechanical sifter is useful for gradation and separation of dry powders or granules based on gyratory vibration principle. This machine utilizes screens of different sizes for sifting and separating of the materials until the required size is obtained.

Instrumentation

Hopper/Coverlid: This covers the ingredients being processed on the upper section of the machine and it prevents them from falling off whenever the machine is vibrating. It also helps in preventing the materials from contamination and dusting and it is held up on to the device by a clamping ring.

Filter Screen: The component aids in providing a smooth surface finish for materials during processing.

Wire Mesh Screen Ring: This is the part where the wire mesh is attached, it has a glue that supports the bonding of the mesh to the ring. This bonding makes the mesh to last longer and helps it remain intact during material processing even with high-intensity vibration.

Oversize Material Outlet: This allows to discharge the large ingredients after the sieving process is completed. It is located on the upper part of the device to allow easy and quick discharge of these large particles.

Screen Material Outlet: It is the outlet for all graded, screened products from the machine. It is located in the lowest part of the machine which allows easy collection of screened ingredients and quick discharge out of the machine.

Springs: Springs ensure the machine has a hydraulic movement. It holds the upper part of the machine as it vibrates and prevents the vibration from reaching the floor.

Working

A mechanical sifter is operated mechanically. It rely on the vibrating principle to function. During operation, as vibration takes place, the screen also vibrates, causing particles introduced through the hopper, to flow through it depending on the size of the particle. This helps in separating, sifting or scalping of the particles depending on the type and settings of the machine. For obtaining the required size, the machine utilizes a screen of different sizes to shift and separate the materials.

Advantages

- Operating and maintenance costs are low.
- It is easy to operate
- Samples are separated in short time

Disadvantages

- Sieve analysis assumes all particles are round (spherical), an elongated particle or flat particle cannot be reliably analysed using this sieve.
- Error can occur if the particles are less than 50 mm.
- If not properly handled and maintained, sieves can become clogged and distorted

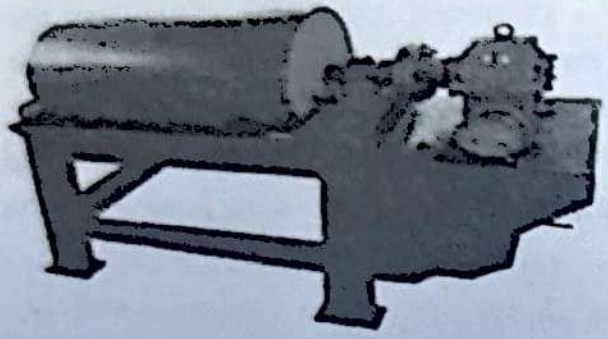
Utility

- It is used for the gradation of raw materials by separating materials based on their particle size.
- Sifting is done to remove lumps or growth that might have formed on the materials after being stored for a longer period and materials are passed through a mesh that opens, which leads to fine the materials.

- It also removes the unrequired foreign particles and separate the materials according to size.
- It is used for the analysis of particle size.

Ball Mill

A ball mill is a type of grinder used to grind or blend materials.

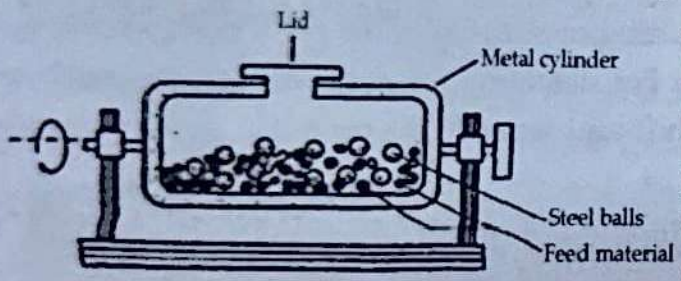


Principle

The ball mill operates on the principle of impact and attrition. In this, impact occurs between fast moving balls and the powder material while the attrition mode comes in action when the hollow cylinder rotates on its longitudinal axis. All occurs at low speed and the balls roll over each other.

Instrumentation

The ball mill consists of a hollow metal cylinder mounted on a shaft and rotating about its horizontal axis. The cylinder can be made of metal, porcelain, or rubber. Inside the cylinder balls or pebbles are placed. The balls occupy between 30 and 50% of the volume of the cylinder. The diameter of the balls depends on the size of the feed and the diameter of the cylinder. The diameter of the balls varies from 2 cm to 15 cm. The balls can be made of metal, porcelain, or stainless steel. The ball acts as a grinding medium.



Working

The drug to be ground has to put into the cylinder of the mill and is rotated. The speed of rotation is very important because

- At low speed, the mass of balls will slide or roll up one over another and will not produce a significant amount of size reduction.
- At high-speed, balls are thrown to the cylinder wall due to centrifugal force and no grinding will occur.

At Normal speed, balls are carried almost to the top of the mill and then fall into a cascade across the diameter of the mill, in this way maximum size reduction is obtained.

For a suitable time the material is taken out and pass through a sieve to get of the required size.

Advantages

- Very fine powder can be obtained.
- Suitable for both wet and dry grinding processes.
- Toxic substances can be ground, as closed cylinders are used.
- Sterility can be maintained due to a closed cylinder system.
- In a ball mill, installation, operation, and labor costs are low.
- Suitable for batch or continuous process.
- Grinding medium is cheap
- The cost of installation and production is low.

Disadvantages

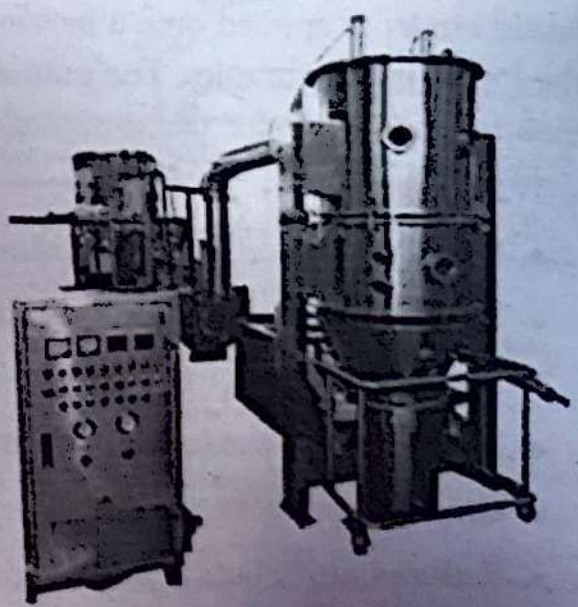
- The ball mill is a very noisy machine especially when a metal cylinder is used.
- Ball mill is a slow process.
- The soft, tacky, fibrous material cannot be milled by a ball mill. These materials may cause problems by caking on the sides of the mill.
- Wear occurs from the balls and the inside surface of the cylinder hence there is a possibility of contamination of the product with mill material.

Utility

- It is used in reducing the size of the drug, churnas of desirable size can be obtained
- Ophthalmic and parenteral products can also be produced.

Granulator

Granulation is a process that is used for producing granules. Rapid Mixer Granulator is designed to achieve excellent mixing and consistent granules at lower operating cost along with higher productivity.

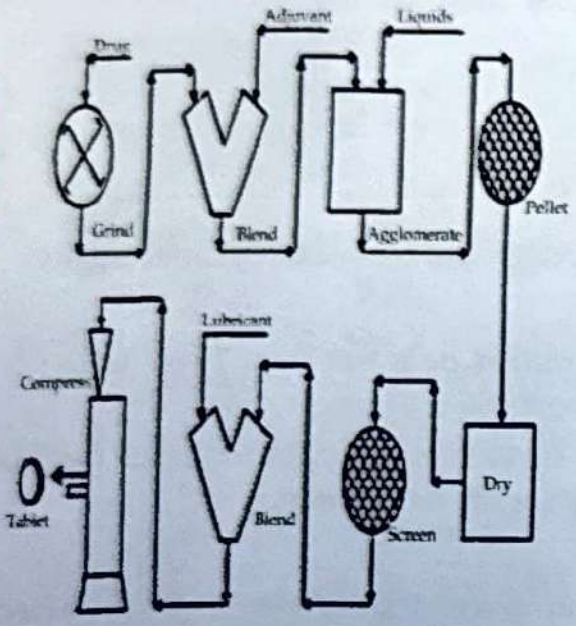


Principle

The Rapid Mixer Granulator is mixing unit with a bottom entry agitator and side mounted chopper for granulation. It works on the basic principle of agitation of the contents of the bowl at moderate speed and then running a specially profiled cutter blade at high speeds into the wet mass.

Instrumentation

Impellers are fixed at the bottom of dome shaped stainless steel bowl. It has fully length and two half-length blades. Impellers are designed such a way that small blade lift the material and full length blades push the material to mix well. **Chopper** are specially designed small blades located at the bottom of the dome. The primary function of chopper is to cut the lumps into smaller fragments those are mixed equally by impeller and aids the bowl or sprayed onto the powder to achieve a more homogeneous liquid distribution. The **discharge port** is mounted horizontally into the dome with vertical downward opening. Granules are unloaded in the container through the discharge port. Opening of discharge port is operated by pneumatic cylinder (compressed air cylinder).



Working

The powder materials are fed into the mixing vessel through the dispensing system. Through rotation and push by the mixing paddle at the bottom, they first move under a fluidizing status and get sufficient mixing. Then the adhesive is injected through the pressure spray gun to turn the dry powders into wet and soft materials. Meanwhile, they are made into even wet granules under the double actions of the mixing paddle and the high-speed cutter on the side wall. A mechanical impeller moves the powder while a liquid binder is applied onto a moving powder bed. Addition of the liquid binder starts the formation of granules. The granulator also has a chopper. Impeller and chopper are mainly responsible for wet granulation in the rapid mixer granulator.

Advantages

- Fast, Precise and accurate granule production.
- Requires a small quantity of binder solution.
- Short powder drying time.
- A predictable production process.
- Greater densification.
- Reduces air pollution due to advanced dust handling properties.

Disadvantages

- Mechanical degradation can occur in case of breakable particles

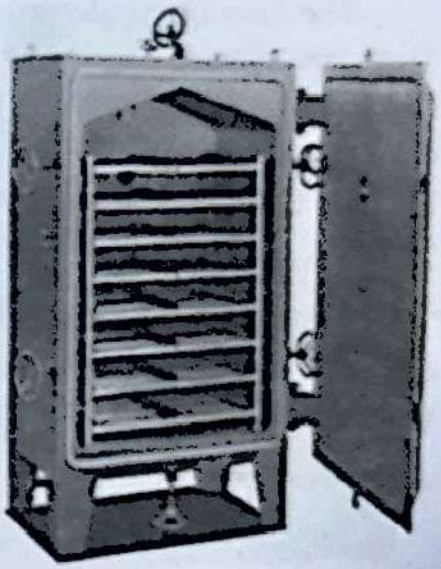
- Over wetting of granules may leads to large size lumps formation
- Require monitoring system to indicate the particle scale up and end of the granulation process

Utility

- In pharmaceutical manufacturing, Granulators produces granules which are used for solid preparation production.
- The Granulator is widely used to mix powdered particles to form granules for the production of tablets and filling in the capsules.
- It is used for dry blending, wet mixing, preparation of dough and granulation, i.e. cutting of the wet mass into small size granules.

Dryer

Drying is a common unit operation used to reduce the levels of water or organic solvent in pharmaceutical materials to acceptable levels. Instruments used for the purpose of drying are called Dryer.



Types of Dryers are

1. **Stationary (Static) Bed Dryers:**

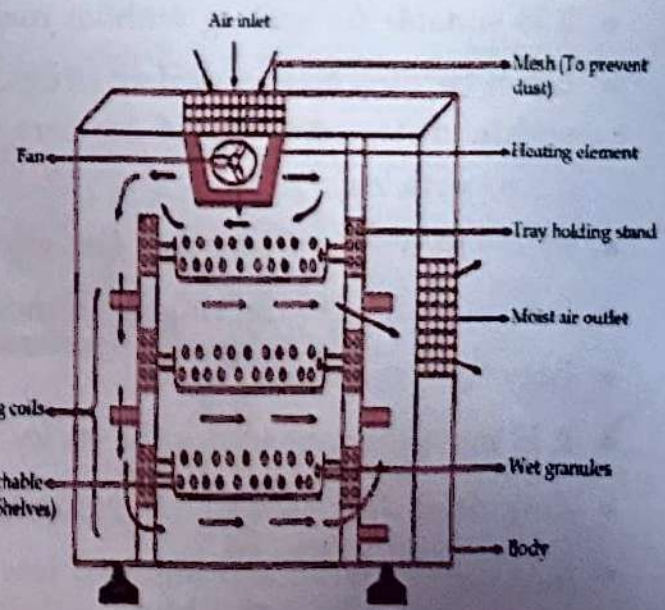
- Tray Dryers- There is no movement between the particles of the material to be dried.
- Tunnel Dryers
- Microwave Dryers-

2. **Moving Bed Dryers:**

- Rotary Dryers - The particles are in motion by gravity or mechanical stirring.
- Rotating Tray Turbo Dryers
- Vacuum dryers-

3. **Fluid Bed Dryers:**

- Particles are suspended in an air stream or gas stream.
- That is to say a solid mixture in gas, similar to a boiling liquid.
- There is a faster drying than system 1 and 2.



A tray dryer is commonly used in Ayurveda pharmaceutical industry to dry powders, granules and other types of materials. It consists of a heated chamber with trays to place materials. The trays are usually stacked one on top of each other, and the drying process is usually done under controlled temperature and humidity conditions.

Principle

The principle of a tray dryer is based on the process of convection drying. Convection drying involves the use of hot air to remove moisture from the material being dried. The hot air is circulated throughout the drying chamber, and as it passes over the trays, it removes moisture from the materials on the trays. The temperature and humidity inside the chamber are controlled to ensure that the materials are dried at the appropriate rate.

Instrumentation

The Tray Dryer design consists of a rectangular chamber whose walls are insulated. Trays are placed inside the heating chamber. Trays may be rectangular or square and the number of trays vary with the size of the drier. The dryer is fitted with a fan for circulating air over the trays. Electrically heated elements are provided inside to heat the air. The thermal efficiency is improved using finned tubes.

Working

Materials to be dried are placed in the trays and kept inside the dryer. Hot air is continuously circulated inside the chamber, and forced convection heating takes place to remove moisture from the solid spread in trays.

Advantages

- The process is rapid, continuous, reproducible and single-step
- It is suitable for scaling without major modifications
- It can be used to encapsulate drugs, extracts, aromatic oils, pigments, and flavors within different types of carriers such as polymeric nanoparticles (NPs) and microparticles.
- Most efficient and consume less energy
- It reduces the drying time by removing moisture at an efficient rate.
- Easy to operate and handle
- It is most efficient to dry for sticky materials
- Tray drier also used to dry equipment and glassware
- It is easy to clean and required less time in product-to-product changeover

Disadvantages

- The tray dryer required more labor to load and unload hence the cost increase

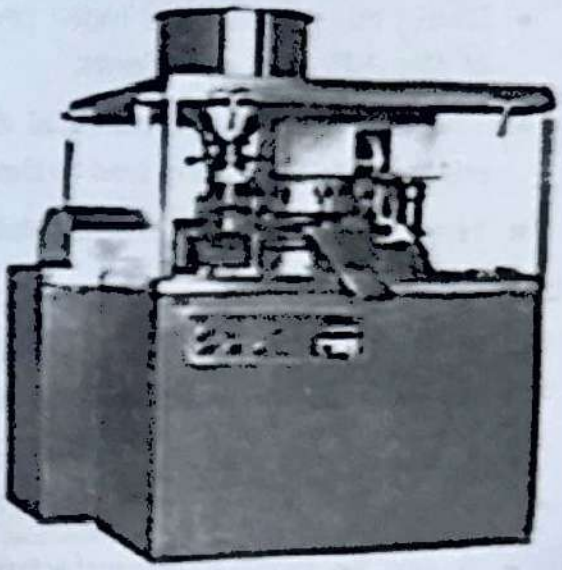
- The dusty solids are not dried in a tray dryer
- It has limited capacity; so it can not use in a large-scale production
- It is not suitable for Thermolabile materials, liquids, and slurries.

Utility

- It can be used in drying crude drugs, Herbs, botanicals chemicals, powders, tablet granules, or parts of the equipment.
- Sticky materials, plastic substances, granular mass or crystalline materials, precipitates, and paste can be dried in a tray dryer.
- It is used to dry materials like; excipients, tablets, powder, and wet granules.

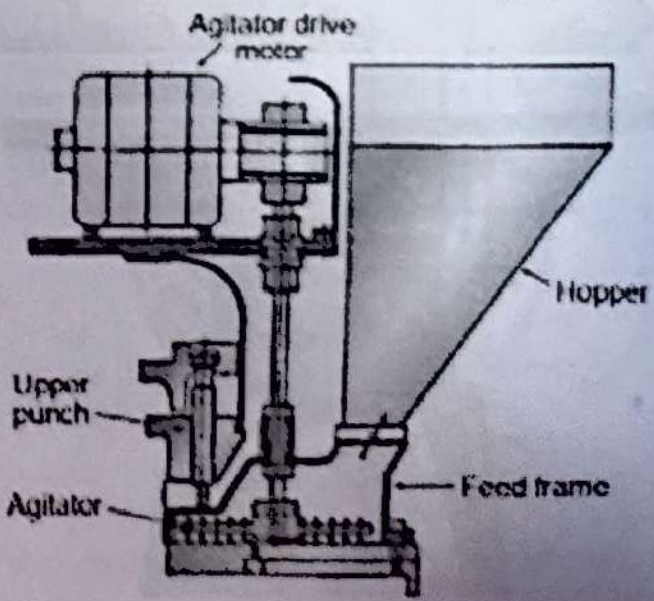
Tablet Compressing Machine

Tablet compressing machine is a mechanical device that compresses powders into tablets of uniform size, shape, and weight containing approximately the same quantity of Active Pharmaceutical Ingredient (API) and excipients. They can be of single punch or rotary type with multiple press.



Principle

All Tablet compressing machine employs the same basic principle of compression. The basic unit of any tablet press is tooling consisting of two punches and a die called a station. The force of compression is downloaded by high-pressure compression rolls which convert the granulated material and holding them together into a hard tablet. The upper and lower punches come together in the die that contains the tablet formulation.



Instrumentation and Working

Hopper is connected to the feed shoe and it is where the granules/powder mixtures are poured into prior to tableting or compression. The hopper can be filled manually or by using mechanical equipment during subsequent tableting. **Die cavity** is where the powder granules are compressed

into tablets. **Punches** comprises upper and lower punch and they compress the powder into tablets of various shapes within the die. **Cam truck** guides the position/movement of the punches. **Tablet adjuster** is used to adjust the volume of the powder to be compressed and so determines the weight of the tablet. **Ejection adjuster** facilitates the ejection of the tablet from the die cavity after compression.

Advantages

- Tablet compressing machine are ideal for applications requiring high batch production, as their design allows for significant output and precise control.
- It has the ability to independently control weight, thickness and hardness of tablets, if equipped with available peripheral devices
- It is very useful to create tablets of uniform shape and size as well as weight.

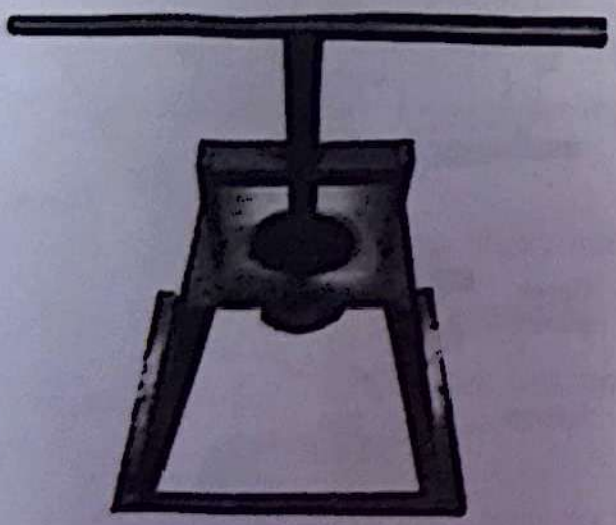
Disadvantages

- Direct compression is more prone to segregation due to the difference in density of the API and excipients.
- The dry state of the material during mixing may induce static charge and lead to segregation. This may lead to the problems like weight variation and content uniformity.
- Hygroscopic drugs are not suitable to use in tablet compressing machine.

Utility

- It is extensively used in pharmaceutical industries for tablet making by compressing the powder or granules into tablets of uniform size and weight.
- Tablet compressing machine is also used in the research and development department for any experiments with Tablets.
- It can be used to manufacture tablets of a wide variety of materials, including pharmaceuticals, nutraceuticals, cleaning products, industrial pellets and cosmetics.

Pills Making Machine



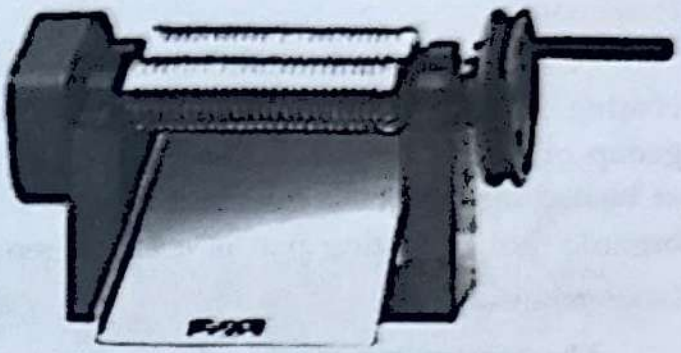
Pill making machine is a machine designed to make the round pills with a thick paste obtained after the process of trituration.

Instrumentation and Working

Stick Pills Making Machine is hand operated machine, which makes the elongated stick of the mixed material. Pill Making Machine can be manual or motorized, consisting of sets of two rollers

with cut groove spaces for a suitable size of pills to be prepared. The unit is with one set of rollers of the desired size of pills 4 to 12 mm.

The elongated stick in the form of thick threads obtained from Stick Pills Making Machine is to be fed in between two rollers in the pill making machine. Both rollers are rotated inwards and pills are cut of varying sizes depending upon the distance between grooves in the roller.



Advantages

- Cost-effective
- Does not require any binders, thereby overcoming few negative effects of binders
- Useful techniques for the manufacture of tablets containing high and low concentration of therapeutic agents

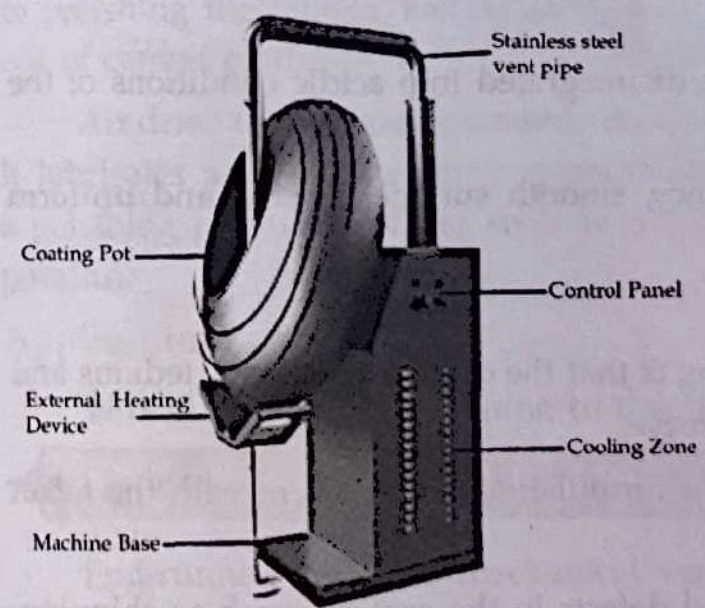
Disadvantages

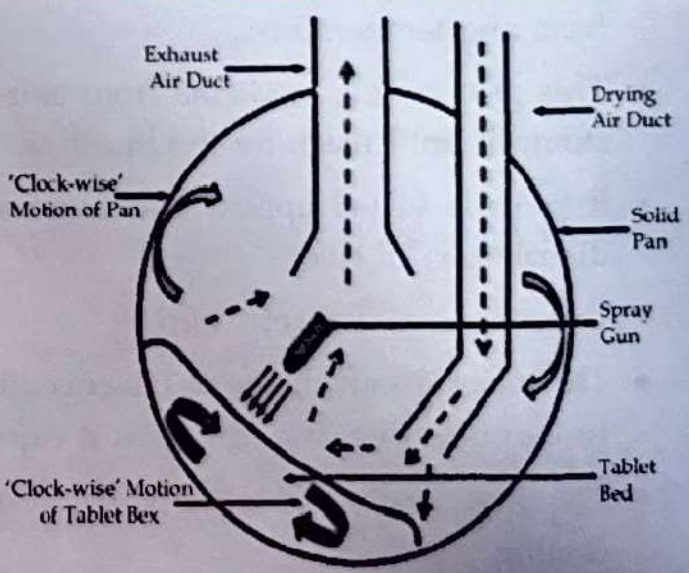
- Often several processing steps are required
- Solvents are required in the process; this leads to number of concerns

Utility

Pill making machine is used for making round pills. This is more useful in the preparation of Ayurveda vati formulation. Here pills can be prepared directly after the process of bhavana without adding any binders and without making them into granules.

Coating Pan





Conventional Coating Pan (Front view)

Tablet coating machine is an equipment that coats the outer surface of tablet with a

thin layer of coating material. It is the mechanical device that apply an essentially dry, thin layer of coating material to the surface of tablet dosage forms in order to confer specific benefits over uncoated variety.

Principle

The working principles of tablet coating machines are relatively simple. Tablet coating machines work by applying coating ingredients in the form of a solution to a group of tablets in a bed that may move horizontally or vertically. A concurrent flow of heated air facilitates evaporation of the solvents. With the help of some aqueous or organic film, a coating pan is used to generate a coat around the pellets.

Instrumentation

The components of this device include a semi ellipsoidal pan fitted with a circular cover to facilitate the charging and discharging of tablets. This pan is rotated with the help of a motor and a gear. It also contains a hot air blowing mechanism that aids in the vaporization of the pharmaceutical pellet's moisture content.

Advantages of Tablet Coating

- The major advantage of tablet coating is that can control the release rate of the drug, and protects from the unpleasant taste and odor of the medicine.
- It improves swallowability and palatability by increasing surface smoothness in the mouth.
- The coating enhances product acceptance and the appearance of the tablet.
- The coating can reduce the frequency of dosing by providing controlled, sustained release.
- It maintains physical or chemical drug integrity by protecting against humidity, heat, and temperature.
- This protects the medicine from being disintegrated into acidic conditions of the stomach until reaching the intestine.
- It provide visual appeal and consistency, smooth surface texture, and uniform distribution of color.

Disadvantages of Tablet Coating

- The major disadvantage of tablet coating is that the coating process is tedious and time-consuming, which makes it expensive.
- The pharmacodynamic properties of the formulation can interfere with the tablet coating.
- The technique may often lead to several defects in the coating, such as chipping, cracks, etc.

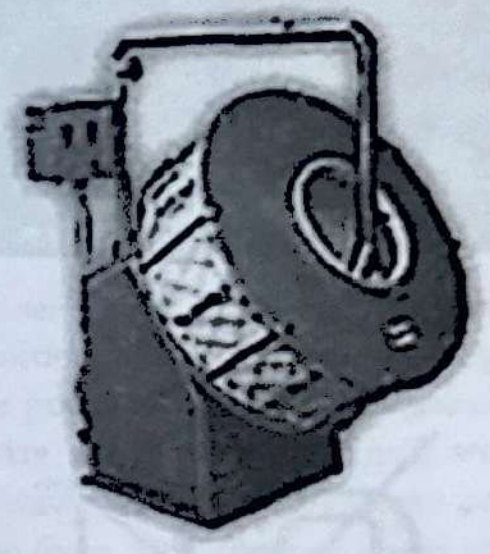
- The coating process is complex compared to other processes and therefore a trained person is required to handle this process.
- Functional coatings are usually possible other than enteric coatings.
- 30-50% weight increase due to coating.
- Material logo or break lines not possible

Utility

Coating pan is used in the manufacturing of pharmaceutical products to coat a tablet with an aqueous or organic film.

Polishing Pan

Detachable Polishing Pan may be provided with Tablet Coating Pan, which is made of mild steel and with inner lining of superior canvas cloth, used for polishing tablets.



Polishing pan is used for polishing purpose, which is made of canvas cloth. The polishing pan rotated at a suitable speed so that the wax coated tablets are rubbed on the canvas cloth. Film prepared or coated by using single or mixture of polymers such as, HPMC, hydroxyethyl methyl cellulose, carbowax, PEG-400 etc.

Procedure of Polishing

Initially, beeswax is dissolved in volatile organic solvent. Then this solvent is used to polishing the tablets. For polishing purpose polishing pan is used, which is made out of canvas cloth.

Air dried talc is most commonly used to polish tablets in pharmaceutical industries. It lubricates and gives a shiny appearance to the tablets. The tablets are polished in a polishing pan using waxes such as carnuba wax, candelila wax, beeswax, and hard paraffin.

Application

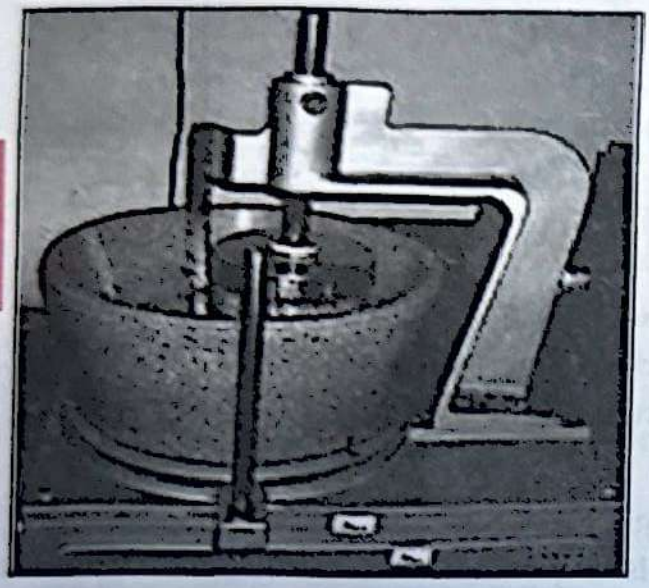
This gives a proper shining to the tablets.

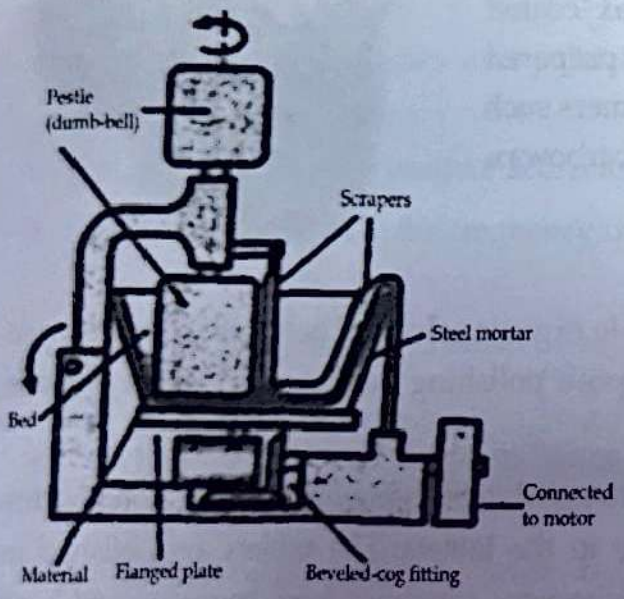
End Runner Machine

End-runner mills are mechanical versions of the mortar and pestle method of comminution.

Principle

The principle of size reduction applied in these mills is crushing due to the heavy weight of the stones or metal pestle and shearing force as a result of the movement of these stones or metal. In the end-runner mill, a weighted pestle is turned by the friction of material passing beneath it as the mortar rotates under powder to be processed.





Instrumentation

This grinding apparatus consists of a stone or metal pestle connected by a shaft. In a shallow steel or porcelain mortar, the pestle revolves on its axis. The pestle is generally in the shape of a dumbbell. At the bottom, the mortar is secured by a flanged plate. Scrappers are located in the center and on either side of the circular pan.

Working

The material to be milled is fed into the centre of the circular mechanical mortar (pan) and is worked outwards by the action of the wheels and mill is operated. The pestle is horizontally positioned and rotates against a powder bed. Mortar revolves at high speed and causes the pestle to revolve. Scrapers are employed in scraping the material constantly from the bottom of the wheel and are feed back to the wheel were it gets crushed further. Finally, pestle is raised from the mortar manually or automatically to facilitate emptying and cleaning.

Advantages

- It is used to reduce fibrous crude drugs to a fine size.
- It is used for uniform distribution of the contents in viscous dispersion medium.
- It can be used for both wet and dry grinding of crude drugs.
- It has no problem of chocking or clogging as it has no sieves for size separation.

Disadvantages

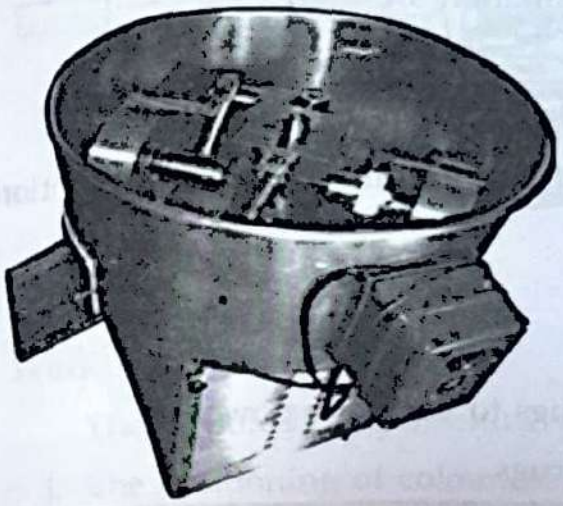
- In comparison to other mills commonly used, it occupies more space.

- There is a possibility of contamination with roller material.
- Milling takes a lot of time.
- Non-sticky materials cannot be milled in this way.

Utility

- It is used to prepare powders, used for various formulation
- It is used for preparing single or multiple ingredient churna formulation
- It is used for grinding semisolid preparations such as ointments and pastes to fine size.

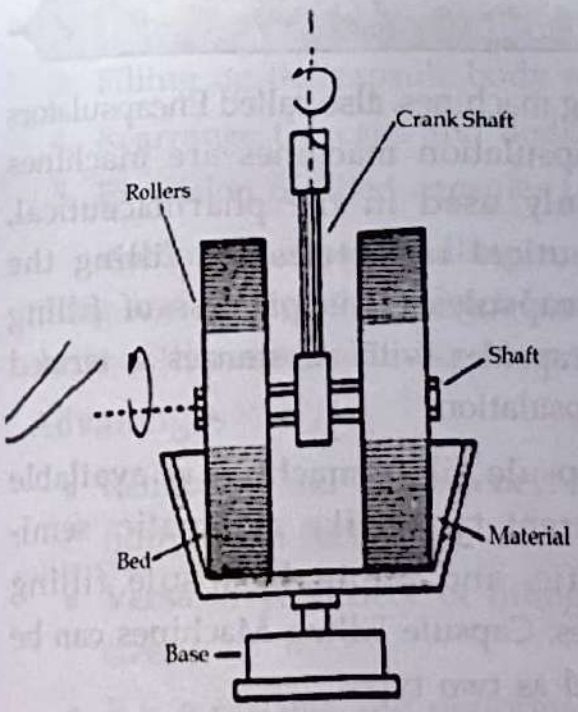
Edge Runner Machine



The edge runner mill is also called a roller stone mill and is a mechanized form of mortar and pestle-type compression comminution. It crushes the materials into fine powders by rotating stones.

Principle

The edge runner mill mainly works on the attrition and impaction by which the crushing or grinding of the powder material takes place. The principle of size reduction by this mill are crushing due to heavy weight of the stones or metal and shearing force. Movement of stones or metal causes size reduction. The Edge-runner mill has the pastel equivalent mounted horizontally and rotating against a bed of powders.



Instrumentation

The basic parts of this mill consist of two heavy rollers and a bed made of stones or granite which is used for the grinding of the materials. The rollers are mounted on the central horizontal shaft and move around the bed in a shallow circular pan.

Working

The material to be milled is fed into the center of the pan and is worked outwards by the action of the wheels. Scrapers are employed in scraping the material constantly from the bottom of the wheel vessel after which it is

fed to the wheel where it gets crushed to powders. The material is ground for a defined period and then it is passed through the sieves to get the powder of the required size. An electric motor in the basement provides power for the mill to start the device as used in flour mills. The crushed powder is discharged through the outlet at the bottom.

Advantages

- This mill is used for crushing or grinding various materials without the danger of clogging or jamming the machine by the accumulation of the powder material, also with greater efficiency and in high comparative quantities.
- It is most preferred for size reduction of non-sticky materials

Disadvantages

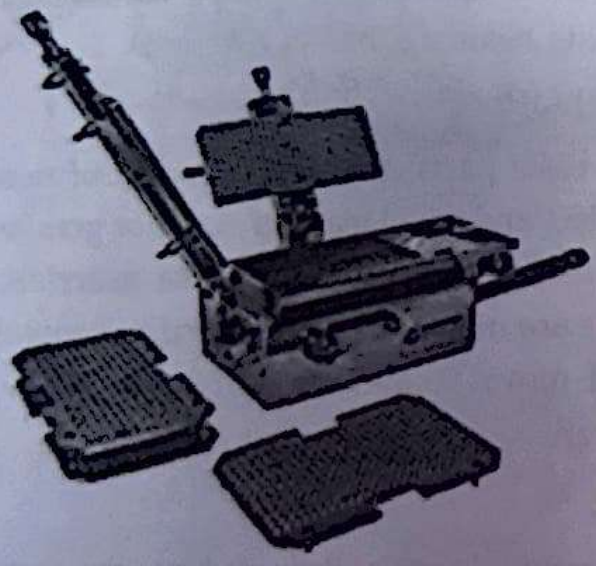
- As it is not much compact, chances of contamination are high.
- No use for sticky materials
- If compared to others mills like Ball mill, it requires more space to install.
- Edge Runner Mill required more time to get results and energy consumption is also high.
- The noise level is high.

Utility

- This mill is used for grinding most of the drugs to very fine powder.
- It is used to crush or grind all types of the drugs.

Capsule Filling Machine

A Capsule Machine, Capsule filler, capsule filling machines, also called Encapsulators or encapsulation machines are machines commonly used in the pharmaceutical, nutraceutical industries for filling the empty capsules. This process of filling empty capsules with substances is termed as encapsulation.



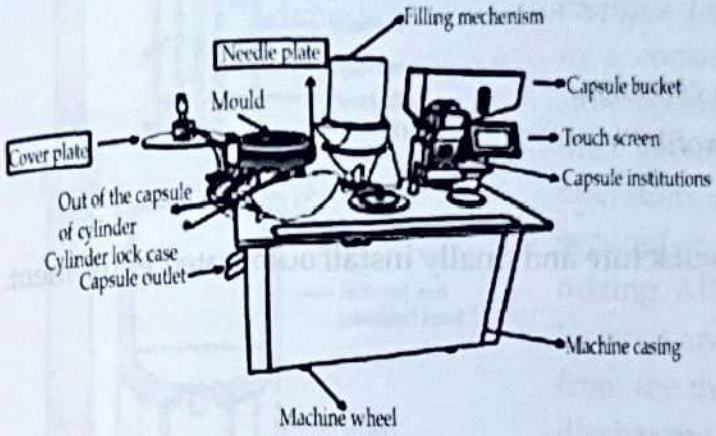
Capsule filler machine is available in different types like automatic, semi-automatic, and manual capsule filling machines. Capsule Filling Machines can be classified as two types.

1. *Hard Gelatin Capsule Fillers*
2. *Soft Gelatin Capsule Encapsulators*

Principle

The capsule filling machine performs various functions: capsule feeding, capsule separating, powder filling, capsule rejecting, capsule locking, finished capsule discharge and die hole cleaning etc. The capsules are rectified, caps and bodies are separated, active pharmaceutical ingredients (API) is filled, wasted capsules are rejected, capsules are locked in place, ejaculated and cleaning of the hole die will be done by capsule filling machine.

Instrumentation



Capsule filling machines have loading trays that hold a volume of 300 holes. A powder tray is also attached to the machine itself. The pin plate works as a filter of the machine and a sealing plate that seals the cap of capsules. A cam handle with a loading tray of about 300 holes on an average is connected with the machine.

Working

The capsule filling machine works in a step-by-step process as mentioned below.

1. The positioning of colourless & translucent capsules in the capsule filling tray.
2. Division of capsule caps from their bodies.
3. Filling up the capsule body with pharmaceutical ingredients
4. Rearrange the caps and bodies
5. Expulsion of filled capsules from the machine

Automatic capsule filling machine can automatically finish capsule separation, filling and locking. A Softgel Encapsulation Machine fills hermetically sealed gelatin shells with a semisolid, liquid or suspension.

Advantages

- Reliability and Consistency: They will allow a repeatable, efficient, and consistent filling with each cycle.
- **Versatility:** Variety of filling materials, as well as capsule types, materials, and sizes.
- It is a scalable and performs in high-speed.
- Capsule fill machine helps to prevent Pharma industries from the loss of the powder material to almost 90%.

Advantages of Capsules

- Capsules are easy to swallow.
- The protection of medicament is possible with capsules.
- Capsules are therapeutically inert & easy to digest.
- It is easy to handle and carry capsules.
- Capsules have higher rate of dissolution as disintegration is only limited to solubilization of shell.
- Capsules have better taste masking

Over liquid dosage form:

- Uniform dosing is possible with capsules.
- Capsules show better stability profile

Disadvantages

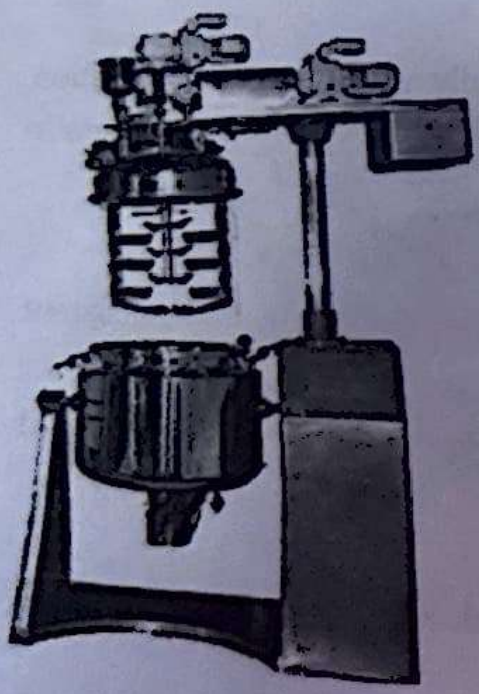
- **Large investment:** To design, manufacture and finally install automated equipment
- Higher level of maintenance.
- Less degree of flexibility.

Utility

Capsule filling machine is used to fill empty soft or hard gelatin capsules of various sizes with powders, granules, semi-solids or liquid substances containing active pharmaceutical ingredients or a mixture of active drug substances and excipients.

Ointment Mixer

Ointment mixer is a high-shear mixer suitable for mixing ointments and other pharmaceutical and cosmetic products.



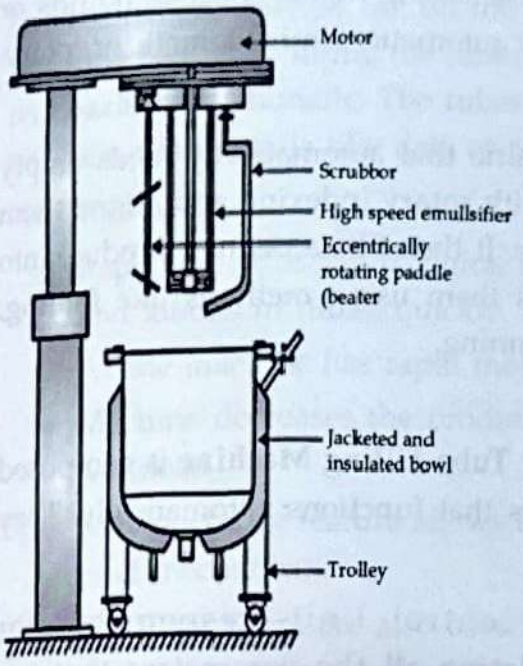
Principle

The ointment mixer works on homogenous mixing action. The principle of this mixer is based on the rotation of blades on their own axis while they travel around the center of the mixing bowl which ensures complete and effective mixing. The mixing blades revolve in opposite direction to sweep the entire circumference of the vessel as well as rotate around its own axis.

Instrumentation

The Ointment mixer bowl is divided in to an upper cylindrical section and a lower hemispherical

section. The mixing elements (beaters) used for mixing are shaped to match the lower curved surface of the bowl. The most commonly used beaters are the batter, wire whip, and hook type. These mixers are provided with a high-speed emulsifiers in the center of the bowl. Scrapers with Teflon edges will be attached to wipe any material which may stick on to the internal surface of the bowl.



Working

The material to be mixed is loaded in to the bowl. The planetary motion of the beater enables faster and better mixing of material in a considerably short time. The operation at slow speed is suitable for dry mixing with less dust generation and faster speed for kneading operation during wet granulation. The bowl is secured to a semi-circular frame at the time of mixing. After the mixing is completed, the bowl is lowered and can be easily detached and removed from the mixer assembly. The mixed contents are discharged either by hand scooping or through a bottom discharge valve or by hydraulically operated automatic discharge systems.

CHAPTER FOUR

Advantages

- Ointment mixers are relatively inexpensive and versatile in applications.
- The product quality is better and more homogeneous.
- Easy to operate.
- Consistent functioning.
- The filling accuracy rate is high.
- It exhibits a higher level of hygienic products and the mixer is easy to clean.
- Being compact equipment, it requires less space.

Disadvantages

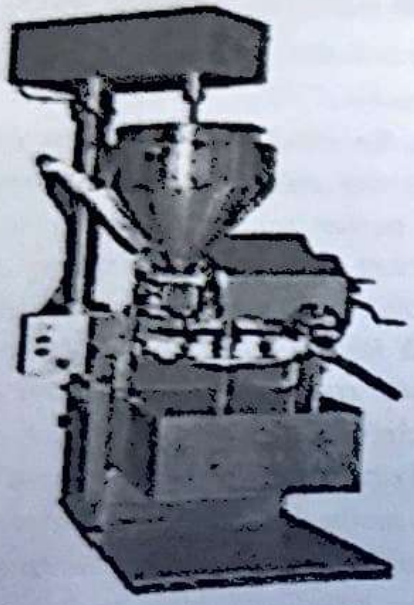
- The equipment generates heat which may be unsuitable for proper mixing.
- When handling high viscosity materials the energy required is more.
- As this equipment consists of moving parts, maintenance is required.
- As labor requirement is more, the process cost is also high.

Utility

- Ointment mixers are used for wet/dry solid-solid materials mixing.
- They are used in mixing several pharmaceutical dosage forms like creams, ointments, suspensions etc.

Tube Filling Machine

Tube filling machine is a machine that fills liquid, cream and other materials into a tube with a cap or nozzle at one end and seals the opening. A tube is a collapsible package, made of plastic or metal, used for packaging highly viscous liquids or pastes. It can be fully automatic, semi automatic or rotary.

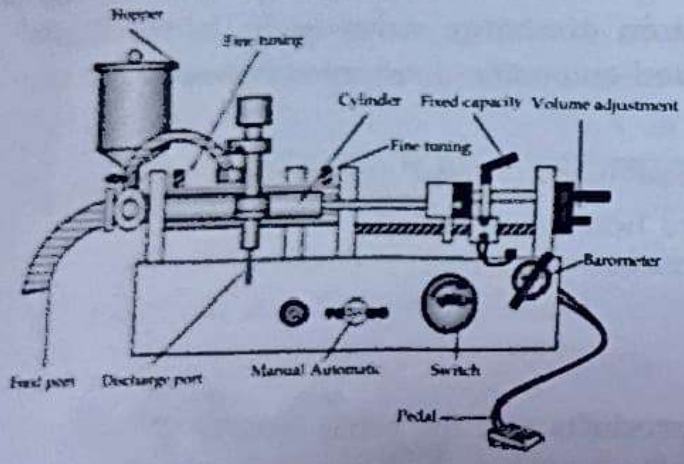


Principle

This is a machine that automatically feeds empty tubes into a table with rotary indexing and aligns them in a specific manner. It then fills a defined product into the tubes and seals them using methods like folding, heat sealing or trimming.

Instrumentation

The Automatic **Tube Filling Machine** is composed of a variety of parts that functions automatically. They include:



Control Unit- responsible for regulating all the parameters that are applicable on this machine.

Electronic Panel- Its components include the PLC that links it to the machine and an air switch for circuit protection.

Tanks- This is where the product that is to be filled in the tubes is held and can be single or many depending on machine design.

Dosing Pump- This is normally a displacement pump that is moderately compressed with positive operation.

Tube Holders- hold up the tubes in the appropriate position when they are being filled by the nozzle.

Hopper- funnel-like structure that is located on the machines upper side for conveying the product into the machine.

Filling Nozzles- Responsible for giving the flow direction to the tube from the filler.

Discharge Unit- Enables the filling of product substance into the tubes from the tanks while determining the quantity required.

Working

Initially, empty tubes are introduced into the tube holder. This process is done automatically or manually depending on the type of machine in use. Also, the rotation of the tube holders is in sync with the rotary table and therefore placing them in different work stations. Here, the control unit is used to set all the parameters and any other functions carried out on the whole process. Besides, the Automatic Tube Filling Machine begins by filling the tubes with the desired material after being aligned under its nozzles. Additionally, The tubes are then tightly sealed and batch numbers printed on them with details like date of manufacture and expiry.

Advantages

- Rapid speed of the machine is an advantage in filling up products like creams and lotions in tubes, quickly.
- As the machine has rapid motion the production efficiency also increases.
- Machine decreases the production cost and the machine also deducts the labour workload
- Easy operative feature allows the user to access the machine without learning any brief mechanism.
- The Tube fillers are also used to reduce the wastage of products as the left overs of the product are collected by the machine and is used in another tube.

Disadvantages

- Tube leakage may occur due to poor sealing.
- Wrong fill levels may result from uncalibrated dispensing systems.
- Clogged fill tubes may slow down the Pharmaceutical Tube Filling Machine.
- Faulty heat sealer units often cause poor seals. Inspecting the heating elements and timers routinely ensures a firm seal every time.
- Improper placement of tubes can lead to misalignment.
- Odd noises can signal machine wear or breakdown.

Utility

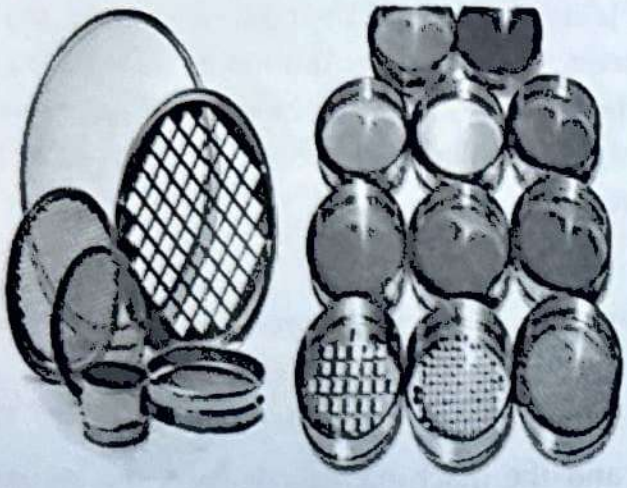
In the cosmetics industry, tube fillers are used for the packaging of gels and creams and in the pharmaceutical industry for the packaging of ointments and toothpaste.

Sieves & Meshes

A sieve, fine mesh strainer, or sift, is a device for separating wanted elements from unwanted material or for controlling the particle size distribution of a sample, using a screen such as a woven mesh or net or perforated sheet material.

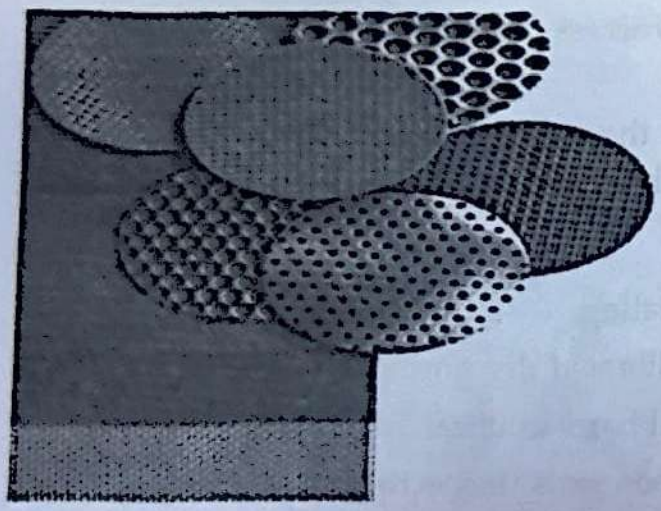
Mesh is a measurement of particle size often used in determining the particle-size distribution of a granular material. Equivalent mesh sizes from 5 µm to 25.4 mm are available.

Principle



The sieving process involves passing a material through a mesh or other device with an opening size of less than the material's particle size. Sieving is performed to separate a sample based on its particle sizes by submitting it to mechanical force. The chosen sieving method determines the intensity, direction, and type of force. The sample is moved either in vertical or horizontal direction. Both movements are superimposed in tap sieve shakers.

Instrumentation



Sieves are constructed of a frame, mesh material, and clamping device. The frames can be made of brass, Stainless Steel or acrylic. Standard frames are round and come in diameters of 3 inch, 8 inch, 12 inch diameters (also available in metric equivalents). The mesh material can consist of woven wire mesh, perforated plate or electroformed material. Aperture sizes for woven wire mesh range from 100 mm to 20 microns.

Mesh is the most common measurement unit used for the sieves and screens. Generally, 40 to 400 mesh sieves are used in pharmaceutical manufacturing during shifting and milling of raw material. Mesh is the number of openings in one linear inch of any sieve or screen. To determine the fineness of the sieve, one should take into consideration the size of the mesh. When the mesh size increases and the pore decreases, the fineness of the sieve increases.

Advantages

- A sieve is used to separate solids based on size.
- A sieve or screener is an essential part of every pharmaceutical production process, particularly as product quality and integrity are so important.
- The use of a sieve gets rid of oversized contamination to ensure that ingredients and finished products are quality assured during production and before use or dispatch.

Disadvantages

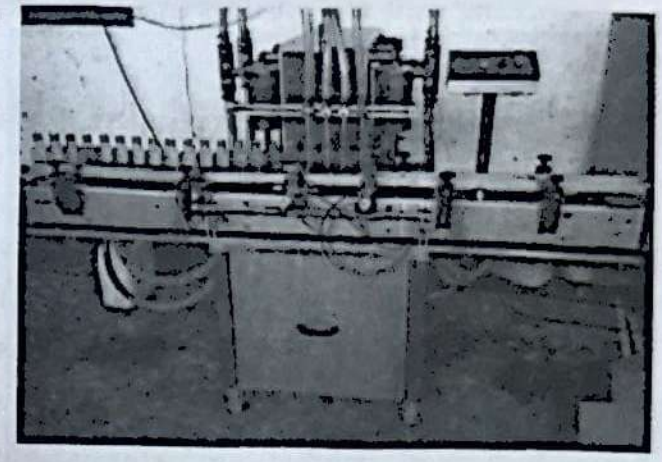
- Sieving cannot be used to separate mixtures with identical sizes of particles.
- Applying force during sieving can also cause a breakup of mixture particles, thus rendering it inefficient for filtering brittle particles.
- Sieving can be used for filtering only dry particles as a sieve cannot separate wet particles.

Utility

- Sieves are widely used to evaluate the uniformity of granular material, as well as measure particle size in powder form.
- Sieves are used in research and development, environmental monitoring, and quality control.

Liquid Filling Machine

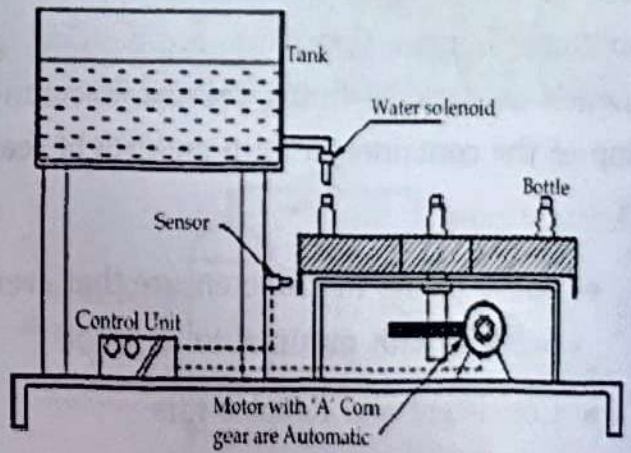
A liquid filling machine is a machine that can be used to fill any kind of bottle or container with a specified and precise volume of liquid. There are two main types of liquid filling machines: those that use pumps and those that use gravity.



Automatic Bottle Filling

Principle

The liquid filling machine operates on the principle of liquid pressure filling. Pump-based machines use a pump to move the liquid up a tube and into the cartridge. Gravity-based machines work by using the weight of the object being filled to force the liquid down a tube into the cartridge. These normally have a pneumatically powered pump mechanism, set to fill containers with the required volume of liquid, fed from either a floor-standing container or a machine-mounted hopper.



Instrumentation

Cork collection tray is the point at which the product due for packaging is filled.

Corking unit is responsible for placing lids for already filled vessels.

Command button panel gives the operator the ability to direct the machine on the intended production cycle.

Bottle support tray is the component holds bottles due for filling in the intended position.

Start pedal is used to start the machine.

Pivot wheels helps in moving the machine to the desired positions.

Liquid collection tank holds liquid due for filling

Bottle support trays holds bottles during the filling process.

Filler tap feeds the liquid products into the bottles.

Inlet solenoid valve regulates the flow of the liquid into the filler taps.

Tray start levers keep bottle support trays in position

Electrical panel is essential in regulating currents that enables the filling machine to function.

Corking unit rati ensures that the corking unit rotates appropriately to fill all the bottles put forth.

Tray lifting pneumatic cylinders is a section in the filling area, which keeps the bottle support trays in position.

Working

Bottles are filled with a variety of liquids, such as oil or other material. Here, a nozzle choice is offered for filling the bottles. To apply force to thicker liquids, pistons or pumps may be utilized depending on how dense or aggressive the liquid is. These normally have a pneumatically powered pump mechanism, set to fill containers with the required volume of liquid, fed from either a floor-standing container or a machine-mounted hopper. Containers are positioned below the filling nozzles and a foot pedal switch to start the filling process. Vacuum bottle filling machines use the rim at the top of the container to form an airtight seal around the filling nozzle.

Advantages

- Bottle filling machine ensure that every bottle is filled with the same amount of product with minimal to no error.
- Consistent and Reliable fills
- High Liquid filling speed
- Liquid Filling Machine offers more Versatility.
- They are easy to use, quick, and accurate.
- They also offer a great option for bulk orders because the machines can fill large quantities quickly.

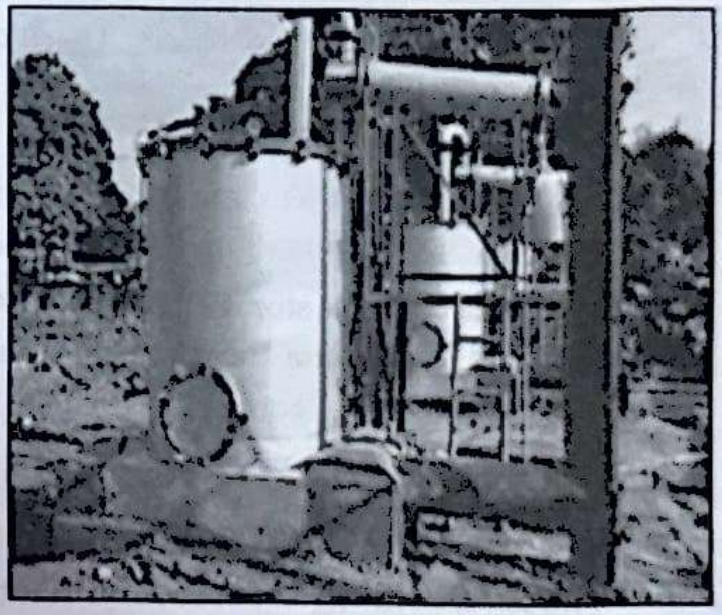
Disadvantages

- Cannot be used in filling solid products
- Needs some level of expertise to operate
- Expensive in terms of purchase and power consumption
- Pump-based machines are generally faster and more accurate, but they can be less prone to failure due to clogged tubes or damaged parts.
- Gravity-based machines are often cheaper, but they can take longer to fill large objects and may not be as accurate.

Utility

Liquid filling machine is used to fill pharmaceutical liquid dosage forms like Kashayas, Taila, Asava Arishta etc.,

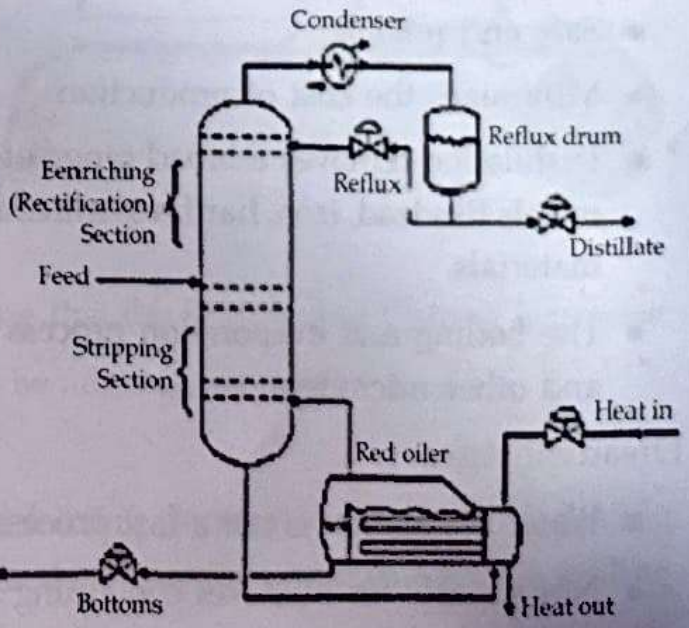
Distillation Plant



Distillation plant is that which is ideal for pharmaceutical, cosmetic and other industries that require large volumes of highly purified water. It involves heating water to the boiling point, converting the water to vapor or steam. As the steam rises, the contaminants polluting the water are left behind. The residue is thrown away. The steam is then condensed creating pure water. Distilled water contains no solids, minerals, trace elements, bacteria, and has no taste or odour.

Principle

In the pharmaceutical industry separation is one of the most widely used unit operations. Though many separation techniques exist, the one most often used is distillation. The basic principle behind the distillation of process is that different liquids boil at different temperatures. So when a mixture is heated, the substance with lower boiling point starts to boil first and convert into vapours which can be then collected separately.



Instrumentation

Equipment components in a standard distillation system include:

- Trayed columns
- Packed columns
- Reboilers
- Condensers
- Scrubber systems

Working

The distillation process is as follows:

- Water is heated in a boiling chamber. The water is heated to a rolling boil, which causes evaporation and steam production.
- Steam leaves the boiling chamber. The steam from the boiling water rises through a vent into a stainless steel condenser. Any microorganisms, impurities and contaminants that are unable to convert into gas particles are left behind in the boiling chamber.
- Steam condenses. Once steam reaches the condenser, it is chilled by a fan until it turns back into water droplets. These droplets are now ready to be collected in a clean container
- Remaining contaminants are removed. Any impurities that have evaporated and condensed with water can now be removed. Usually, an activated carbon filter will trap these contaminants using the process of adsorption.
- Water collects in a storage container. After passing through the filtration media, water will drip out of the distiller's spout and into a holding container. This water is now clean, pure, and ready for use.

Advantages

- Can be easily operated
- Best process for the separation of solute and solvent
- Safe and reliable
- Minimizes the cost of production
- Distillation removes a broad range of inorganic compounds from water, including metals like lead, iron, hardness minerals, nitrates, sodium, and most other dissolved materials.
- The boiling and evaporation process is also effective in killing viruses, bacteria, and other microorganisms.

Disadvantages

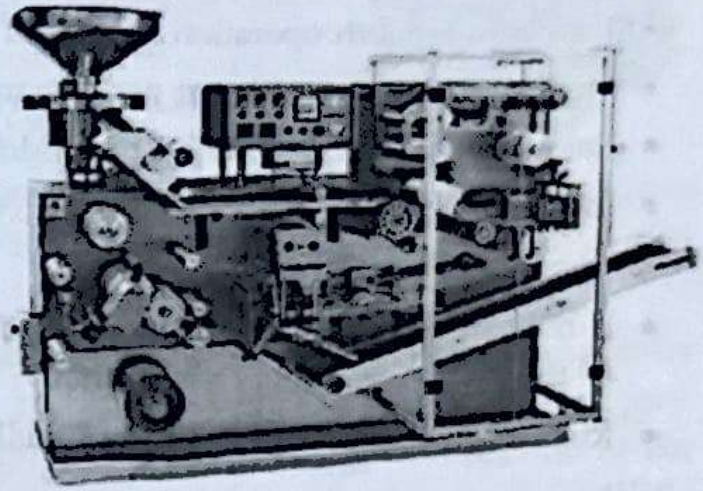
- Water distillation is not a fast process.
- Not suitable for mixtures containing thermolabile components.

Utility

- Distillations are frequent in the pharmaceutical industry for small scale solvent recovery applications, for the purification of high valuable oils or also in waste water treatment units of small capacities.
- It can also be used in pharmaceutical and cosmetics manufacturing, also in laboratory experiments.
- Distilled water may also be used to sterilize medical equipment and surfaces.

Strip Packing Machine

It is the machine which involves the process of packaging of the pharmaceutical products like capsules and tablets between two sheets of aluminum foils, cellophane, polyethylene, or any other type of heat sealing material.



Principle

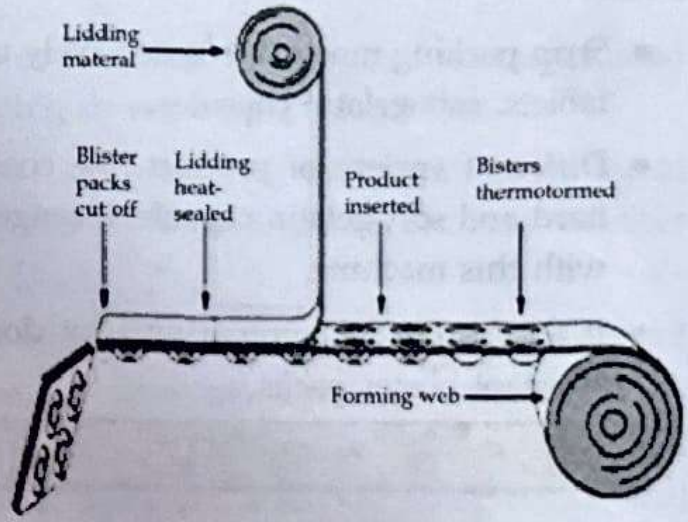
This high tech strip packer machine effectively executes feeding, sealing, slitting and cutting simultaneously.

Instrumentation

Vibrator: It conveys the products through supply tablets to the Chute.

Chute: It grips various pieces and centres them so that they can enter in to the sealing Roller.

Sealing Roller: The Sealing Roller temperature can be effectively maintained because of the precise temperature control device.



Slitting: It is easy to adjust the column number and location of the slitting.

Draw Brushes: Tense the strip and ensure that the Sealing and Cutting is precise.

Cutter: The row number of cutting can be adjusted as per the need.

Working

The product is fed through hopper and feeding device flows to the heat sealing roller cavities, the desired laminated foil from the two rollers is drawn on the sealing

rollers which packs and seals the products continuously. The sealed strip passes through the vertical and horizontal cutters to get desired strip sizes.

Advantages

- Packaging is designed to contain a product so that it is unable to interact with the environment.
- Packaging must provide the protection, identification, information against the physical damage, loss of content or ingredients and intrusion of unwanted components of the environment such as water vapour, oxygen and light.
- It is designed to protect the product from damage during transportation and distribution.
- Easy and smooth operation
- High strength and efficient performance
- Easy maintenance and long service life
- Ideal for heat sealable foils

Disadvantages

- If the formed strip pockets are too tight, wrinkling of the seal area or perforation of the pocket periphery may occur.
- Risk of product damage during handling /prone to mechanical damage

Utility

- Strip packing machine is extensively used to pack tablets, capsules, caplets, coated tablets, soft gelatin capsules.
- Different variety of product like coated and uncoated tablet of any size/shape, hard and soft gelatin capsule, lozenge, Ampoule and vial tray packs can be done with this machine.
- It is also used in preparing Unit dose hospital packs, Multi product and child resistant blister packs.

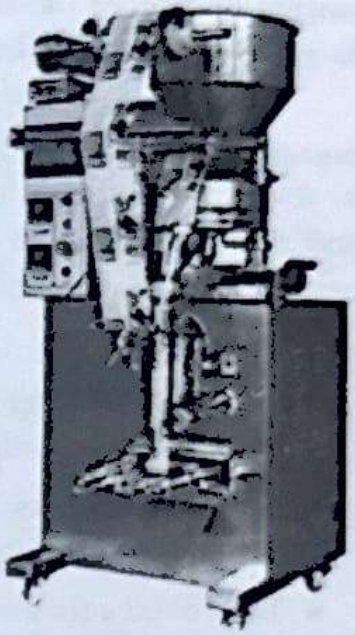
Pouch Filling Machine

Pouch filling/packaging machines are devices that are used to package products in pouches. Pouch filling or pouch packing machines are the equipment which fills premade pouches with product and then seals them shut. Pouch fill and seal machines come in two main varieties: Rotary and inline.

Principle

They are designed to enclose products in a bag or pouch. Pouch packaging machines use a variety of methods to fill and seal pouches. The most common method is heat

sealing, which uses heat to weld the pouch shut. Other pouch packaging machines may use ultrasonic sealing, which uses sound waves to weld the pouch shut, or adhesive sealing, which uses an adhesive to seal the pouch shut.



Instrumentation and Working

As the pouches are fed into the packaging machine, they are gripped and held as a rotary table moves counter-clockwise through different static machine 'stations' that are laid out in a circular fashion on the perimeter of the equipment. There are usually between 6–10 stations on a rotary pouch packing machine. Different steps of the pouch filling and sealing process occur at each station.

Pouch Loading- Preformed pouches are first loaded into the bag magazine of the liquid filling and sealing machine. This is a manual process to be completed at regular intervals by an attentive human operator. The pouches are then conveyed to the interior of the machine by a bag feeding roller.

Pouch Gripping- When a pouch is detected in the magazine by a proximity sensor, it is grasped with vacuum suction pads and lifted to a set of bag grippers, which will consistently hold the bag through its entire journey to each station of the pouch packing machine.

Optional Printing/Embossing- If date or lot codes are required on the finished package, this station can be fitted with printing or embossing equipment.

Pouch Opening- At this step, vacuum suction pads grasp the outside of the liquid pouch and gently open the bag. Sensors are present in the bag area to detect whether a pouch is present.

Liquid Product Filling- A pre-specified dose of the liquid product is now pumped into the pouch by a liquid piston filler that can draw product from a holding tank or hopper. Optional second filling station- If the product has both liquid and solid components or the bag requires a high volume liquid fill, a second filling station will dispense liquid product.

First Sealing Station & Deflation- Prior to liquid pouch sealing, two wire deflator components ensure any extra air is squeezed out of the bag. To ensure proper pouch closure, two sealing stations are usually required for liquid applications, this being the first. A pair of heat seal bars closes over the sealing area on the top part of the pouch, adhering sealant film layers to one another to create a closed seam.

Second Sealing Station- Identical to the previous step, the second heat sealing

station reinforces the seal, ensuring a completely closed package seam. A second statio is not required for ultrasonic sealing.

Seal Cooling & Discharge- To strengthen and flatten the seam, a cooling bar no passes over the sealed portion of the pouch. This cooling bar can also add serration to the seam if desired. The finished liquid pouch is now discharged onto a conveyo and can be held in a receptacle or transported downline to ancillary equipment lik case or carton packers.

Advantages

- Pouch packaging machinery is a popular choice for companies since they are easily customizable, help to cut labor and material expenses.
- Sustainability is one of the major benefits of using pouch packaging machines because it can help reduce the environmental impact of packaging products.
- Improved efficiency
- Pouch packaging machines help to reduce waste.
- Pouch packaging machines can also improve productivity.
- It ensure product safety.

Disadvantages

- High initial investment and maintenance costs
- Limited Flexibility- Prefabricated bag packing machines are designed to work with pre-made bags, limiting their flexibility in terms of packaging design and size.
- Technical expertise required
- Fragility- Prefabricated bag packing machines can be fragile and prone to break down if not handled and maintained correctly.

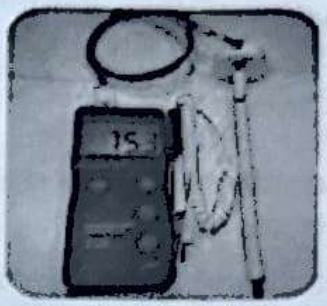
Utility

- This machine can be used to pack a variety of products, including food, cosmetics and pharmaceuticals.
- The products to be packaged can range from liquids (Taila, Kashayas, Asava Arishtas), solids (Vatis), powders (churnas), Granules (khanda), and even pastes (Avaleha).

Pyrometer

Pyrometers are the temperature measuring devices used to detect the object's temperature and electro magnetic radiation emitted from the object. Pyrometer is also known as an Infrared thermometer or Radiation thermometer or non- contact thermometer used to detect the temperature of an object's surface temperature, which depends on

the radiation (infrared or visible) emitted from the object. Pyrometers act as photodetector because of the property of absorbing energy and measuring of EM wave intensity at any wave length.



Principle

Pyrometer measures the object's temperature by sensing the heat/radiation emitted from the object without making contact with the object. It records the temperature level depending upon the intensity of radiation emitted.

Instrumentation and Working

The pyrometer has two basic components like optical system and detectors that are used to measure the surface temperature of the object. When any object is taken whose surface temperature is to be measured with the pyrometer, the optical system will capture the energy emitted from the object. Then the radiation is sent to the detector, which is very sensitive to the waves of radiation. The output of the detector refers to the temperature level of the object due to the radiation. The temperature of the detector analyzed by using the level of radiation is directly proportional to the object's temperature.

Advantages

- Non-contact measurement- It can measure the temperature of the object without any contact with the object.
- It measure the temperature very accurately, precisely, pure visually and quickly.
- Good stability while measuring the temperature of the object.
- It can measure the temperature of moving objects or constant objects from a greater distance.
- Cheap.
- Easy to read.
- Can be submerged in liquids.
- Require very little maintenance and are reliable.

Disadvantages

- Accuracy of the device can be affected due to the different conditions like d smoke, and thermal radiation.
- They break easily and there is risk of mercury poisoning if the glass tube bre

Utility

- It is used to measure the temperature during various heating process done in dr processing.
- To measure the temperature of liquid metals like mercury and highly hea materials.
- To measure furnace temperature

Discussion

Rasashastra is a specialized branch of Ayurveda which deals mainly with met and minerals. This science includes the pharmaceutical preparations which has emerg as an integral part of Ayurvedic therapeutics. A stringent and meticulous pharmaceuti procedures are to be employed to convert these metals and minerals in to such a for that they can show their therapeutic efficacy without any adverse effect. Shodhan marana, bhavana, jarana, murchhana, satvapatana etc. are the procedures which a used for the preparation of various formulations. To perform these complex procedure RasAcharyas developed various equipments and tools which are termed as Yantra These Yantras helps to purify and process raw minerals and also to formulate medicine of mineral or herbo mineral preparations.

Bhaishajya Kalpana is the science of Ayurveda pharmaceutics which deals with th various methods of processing and preparation of single and compound formulations. In the past few years both these branches have achieved advancement due to availabili of reliable tools and machine, thus making the pharmacy of Ayurveda more efficien For conducting & operating different Kalpanas like Churna, Vati etc., different Yantra are used. Due to implementation of advanced technology in various preparation Ayurveda pharmacy had improved and became more efficient. Moreover the use o modern machines like disintegrator, grinder, pulverizer, Tablet making machine ha made the manufacturing of Ayurvedic preparations more efficient, reliable and increase in the production. The concept of these machines has helped a lot in establishing Ras shastra and Bhaishajya Kalpana to advanced and higher level production. Due to thi these both fields are growing rapidly and helping the Ayurveda pharmacy to exten more efficiently.

Conclusion

Rasashastra and Bhaishajya Kalpana approaches more practical aspects than theory. For successful accomplishment of the procedures, Yantras plays an most important role. Yantras are significantly important in processing of Rasaushadhis as well as preparation of various formulations. Though Yantras mentioned in classics are of older methods, they had given the concept and ideas and this can be implied in new machines. Adopting advanced instruments and technology reduces human effort as well as time and products can be more easily prepared in large scale within short duration.

Extended learning

- Record the contemporary machines used in Ayurvedic drug preparation.
- Enlist Ayurvediya aushadhi kalpana and equipments/yantras/machines used for preparation of each kalpana.
- Interpret the mechanism and effect of Yantras/machines on the Physical and Chemical properties of the drug material.

References

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- Pharmaceutics I & II by Mehta R M, Vallabha Prakashana, 2014
- Handbook of Pharmaceutical technology by Poonam Kushwaha published by The Health sciences publisher, New Delhi, 2015.

MODEL QUESTIONS

Short Answers

- Define Yantra. Enumerate different Yantras explained in Rasashastra texts and explain any Yantra with its utility.
- Write the description, Principle involved, practical utility and importance of Ulukhala Yantra.
- Write any 5 names of modern instruments/equipments that are used now-a-days in Ayurvedic pharmacies and explain any one instruments in detail.
- Explain the Yantras required for Parada Asta Samskara and write their importance.
- What is Yantra? Explain the Valuka Yantra with diagram and its utility in the pharmaceutical field.
- Briefly describe the Dola yantra with Principle and figure
- Explain the Swedani Yantra with Principle and diagram
- Nirmana and Upayoga of Vidyadhara Yantra
- Construction of Damaru Yantra and its uses.
- Define Yantra. Explain Patana Yantra in detail.
- Importance of Yantra in Rasa-shashtra.
- Explain the following with principle, application and proper diagram :
  - Disintegrator
  - End Runner
  - Edge Runner
  - Sieve-Shaker
  - Granulator
  - Tableting machine
  - Pill making machines
  - Coating pan
  - Capsule filling machine
  - Sieves and mesh
  - Mixer & Grinder

CHAPTER 5

YANTROPAKARANANI – II
(EQUIPMENTS, FUEL AND HEATING DEVICES)

PAPER 1

Contents

- Definition, Benefits, Types of Puta, Description and Utility of Chandra Puta, Surya Puta, Maha Puta, Gaja Puta, Varaha Puta, Kukkuta Puta, Kapota Puta, Lavaka Puta, Budhara Puta, Gorvara Puta, Valuka Puta, Kumbha / Bhanda Puta; Musha- Samanya Musha, Crucibles- Silica, Mudra, Sandhi Bandhana Material; Koshthi- Chullika, Angara Koshthi, Satwapatana Bhashtri.
- Principle involved, importance of temperature, currently used heating devices, quantum of heat and Instruments used in Large scale Production of above yantras.
- Working principle, Advantages, Disadvantages and Utility of Gas Stove, Hot Plate, Heating Mantle, Induction Stove, Hot Air Oven, Muffle Furnace- Horizontal and Vertical.
- Heating Material Solid- Kashtha, coal, Valuka, Kshara, Lavana, Shakrit, Drava- Jala/ steam, Taila, Indirect heating- Dhanya Rashi, Bhugarbha sthapana.

Learning Outcome

At the end of this chapter, Students can able to

1. Define the term Puta and know its classical explanation.
2. Produce categorical information (Size of Pit, Number of cowdung cakes, use etc.) about various Putas and recognise the principles behind their construction and working.
3. Know the names and significance of temperature measuring devices with reference to Puta.
4. Enlist various devices used for heating during Ayurvediya Aushadhi nirmana.
5. Define the term Musha, know its uses, types of Crucibles and enlist constituents needed for Samanya Musha Nirmana.
6. Explain the Pharmaceutical use of the Hot plate, heating mantle, induction stove, hot air oven, muffle furnace (horizontal and vertical type).
7. Describe types of Koshthi and their uses.

Introduction

Bhasmas are unique preparations, which are mentioned in Rasashastra. As the metals and minerals are heterogenous to the human body and cannot be absorbed if taken as such, they need to undergo different processing which includes Shodhana, Marana and others. For this purpose some special type of heating devices are used. The devices used to provide optimum temperature for particular duration for preparing Bhasmas of different metals and minerals are known as puta.

Definition

रसादिद्रव्यपाकानां प्रमाणज्ञापनं पुटम्। नेष्टो न्यूनाधिकः पाकः सुपाकं हितमौषधम्।। (R.R.S.10/47)

Puta is the unit of measurement of heat applied during various pharmaceutical procedures of Rasa dravyas. The main purpose of puta is to provide required amount of heat for the sufficient period which is necessary for the preparation and processing of wholesome medicine. Neither sub optimal nor excess of temperature is recommended.

रसोपरसलोहादेः पाकमानप्रमापकम्। उत्पलाद्यग्निसंयोगात् यत्तदत्र पुटं स्मृतम्।। (R.T.3/32)

Puta is the measurement of heat applied for the pharmaceutical processing of Rasa, Uparasa, Loha and other rasa dravyas. Cowdung cakes and others fuel sources are generally used in the puta.

CHAPTER FIVE

Benefits of Puta

लोहादेरपुनर्भावो गुणाधिक्यं ततोऽग्रता। अनप्सु मज्जनं रेखापूर्णता पुटतो भवेत्।।
पुटाद् आप्तो लघुत्वं च शीघ्रव्याप्तिश्च दीपनम्। जारितादपि सूतेन्द्राल्लोहानामधिको गुणः।।
यथाश्मनि विशेद्वह्निर्बहिस्थपुटयोगतः। चूर्णत्वादि गुणावाप्तिस्तथा लोहेषु निश्चितम्।। (R.R.S. 10/48-50)

The benefits of puta are as below :

- Bhasmas of loha and others will attain apunarbhavatva property (cannot revert its metallic state).
- Puta enhances the guna (beneficial quality) of the dravya and makes the medicine superior.
- The bhasma becomes light and attain varitaratva, which makes it float on water.
- It makes the bhasma superfine so that it can enter into the grooves of fingers.
- By subjecting rasa dravyas to puta, they become laghu (light for digestion), sheegravyapi (gets readily assimilated in the body) and deepaniya (enhances the digestive fire when taken internally).
- Lohas (Metals) when subjected to puta, becomes bhasma which will have superior quality than the parada which has undergone the process of Jarana.
- By the influence of external heat of the puta, Lohas which are hard like stone will undoubtedly get converted into powder (Bhasma) form and prove to be more beneficial.

Types of Puta

Putas have been divided into various types based on:

- Size of the furnace.
- Quantity of fuel.
- Nature of fuel.

- Apparatus and medium of heat used.

i) Putas are named mainly on the basis of names of animals, which indicate their size and temperature range. Example: Gaja puta, Varaha puta, Kukkuta puta.

ii) According to the Nature of fuel used, Putas are classified as follows:

Cowdung cakes	Gorvara choorna	Tusha (Husk)	Valuka (As medium of heat)
Maha Puta	Lavaka Puta	Lavaka Puta	Valuka Puta
Gaja Puta	Gorvara Puta	Bhanda Puta	
Kukkuta Puta	Kapota Puta		
Varaha Puta			

iii) According to the apparatus used: Bhanda Puta, where a Pot is used.

iv) In Dhanya Rashi Puta, Drug is kept in a bottle and buried in a heap of yava or shali. Ex. Preparation of Asava Arishta, Chandrakala Rasa.

v) In Bhoogarbha Puta, Drug enclosed in musha or sharava samputa is kept beneath the ground, so as to get constant mild heat.

vi) Based on source of heat, Puta is of 3 types :

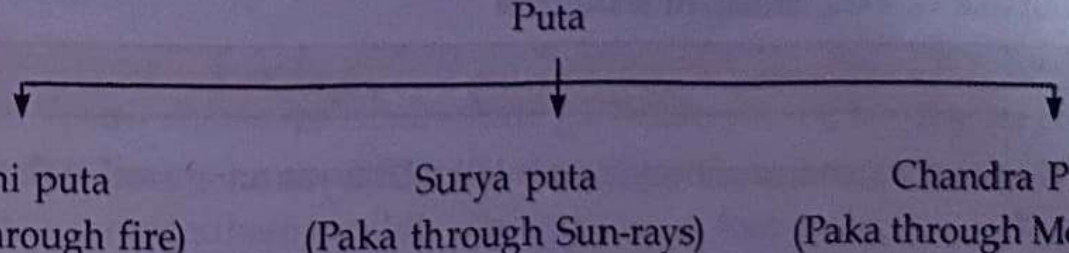
1. **Agni Puta** : Drug enclosed in sharava samputa is heated directly using burning cowdung cakes. Ex. Preparation of Abhraka Bhasma.
2. **Surya Puta** : Drug material is dried or heated by exposing it to intense sunlight. Ex: Loha bhanupaka, suryatapi taila.
3. **Chandra Puta** : Drug material is kept or triturated in the moon light. Ex : Preparation of pravala pisti, Mouktika pisti.

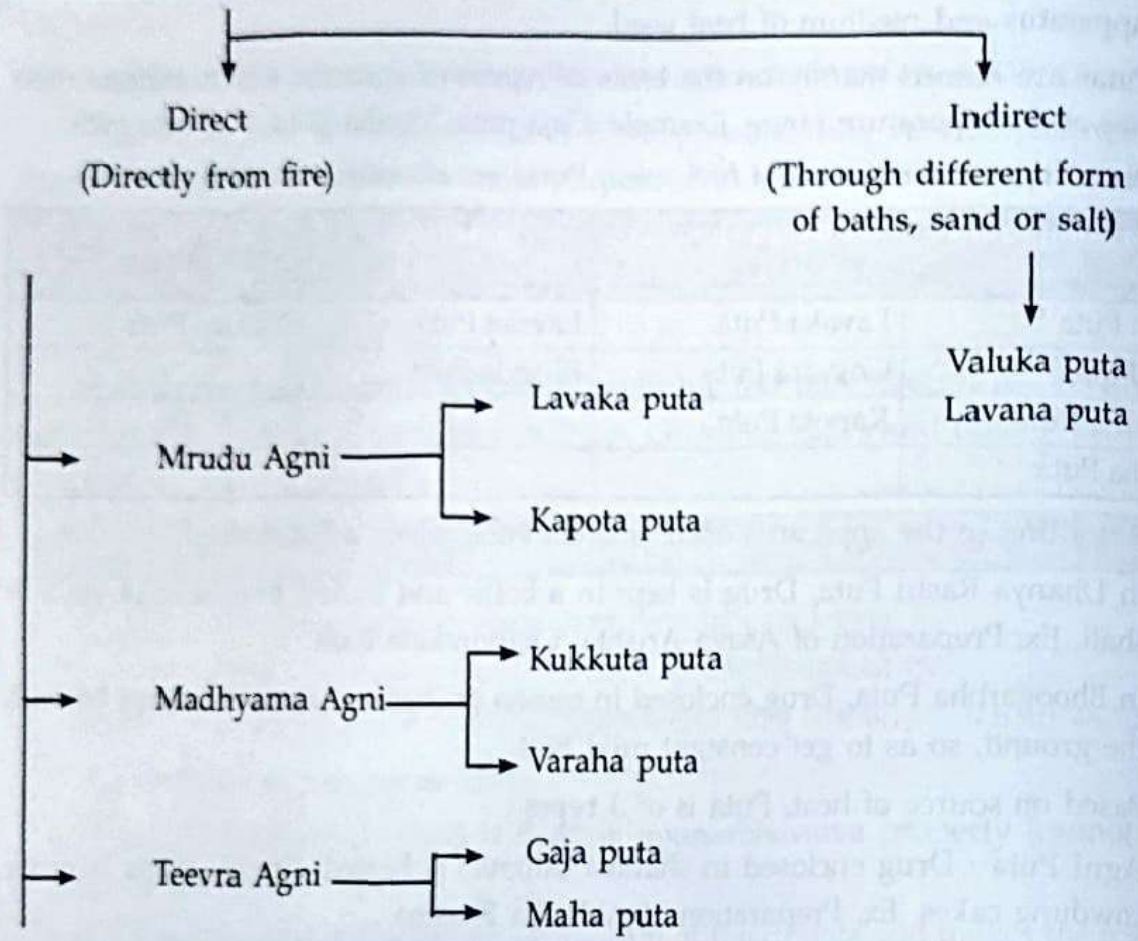
Mainly two types of puta are mentioned in ancient classics, Chandra puta is added by Acharya Yadavji Trikamaji.

Among these three, Agniputa is commonly used and it is again divided into 3 types based on the degree of heat applied :

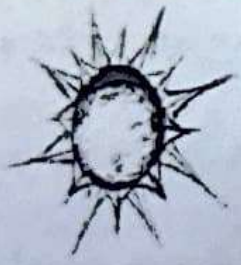
1. Mrudu 2. Madhyama and 3. Teevra

Each type is further divided into different types depending upon the quantity of fuel and the size of puta. Lavaka puta and Kapota puta will provide mrudvagni, Kukkuta puta and Varaha puta will provide madhyamaagni and Gaja puta and Maha puta will provide teevragni.



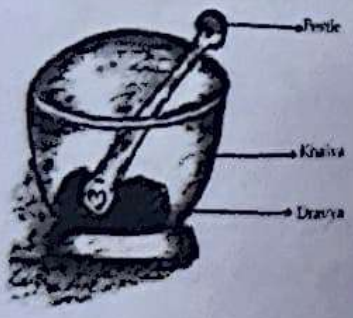


Surya Puta



In surya puta, sun is the source of heat. It is also called Raudra puta or Bhanu paka. This source is also used in the preparation of taila like suryapaaki kutaja taila and other such kalpanas.

द्रव्याणां भावितानान्तु भावनौषधजै रसैः।
शोषणं सूर्यतापे यत्तत्सूर्यपुटमुच्यते।। (R.T. 3/37)



Dravyas which need to undergo surya puta are mixed and triturated with the bhavana dravyas like swarasa, kwatha etc. and dried in the sunlight till the liquid gets dried up. This process is called surya puta.

Utility

Bhanupaka of loha, Shilajatu shodhana

Chandra Puta

In Chandra puta, source of heat is moonlight. Dravyas are mixed with the prescribed

dravas and bhavana is done in the moon light or kept in moon light till the liquid gets dried up. It is also called Soma puta.

Utility

Chandra puta of Pravala bhasma.

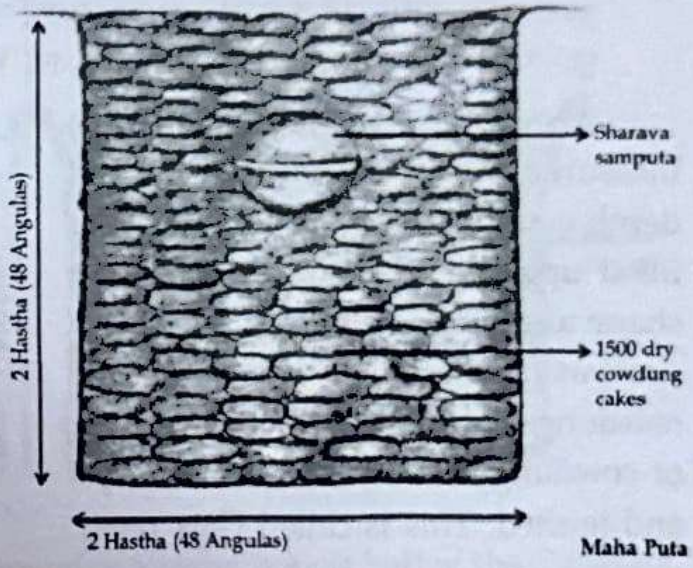
Maha Puta

This is the biggest puta mentioned in the Rasa shastra classics.

निम्ने विस्तरतः कुण्डे द्विहस्ते चतुरस्रके। वनोत्पलसहस्रेण पूरिते पुटनीयम्।।
क्रौंच्यां रुद्धं प्रयत्नेन पिष्टिकोपरि निक्षिपेत्। वनोत्पलसहस्रार्धं क्रौंचिकोपरि विन्यसेत्।
वह्निं प्रज्वालयेत्तत्र महापुटमिदं स्मृतम्।। (R.R.S. 10/5152)

व्यामार्द्धनिम्ने चतुरस्ररूपे हस्तद्वयायाममिते च कुण्डे। वन्योत्पलापूरितगर्भभागे मूषां निदध्यात्पुटनीयपूर्णाम्।।
पुनस्तु विन्यस्य वनोत्पलानि सम्पूरयेत्कुण्डमुखं रसज्ञः। सन्दीप्य वह्निं पुटनं ततस्तन्महापुटाख्यं विबुधैः प्रदिष्टम्।।
(R.T. 3/38-39)

A square pit measuring 2 Hastha (36") in length, width and height is made and filled with 1000 cowdung cakes. The dravyas to be subjected for the marana are taken in the sharava samputa or musha. After proper sealing it is placed over the cowdung cakes. Then the half the number of the cowdung cakes i.e., 500 vanopalas are filled over the Sharava samputa or musha in the pit and ignited. This is called Maha puta.



Maha Puta

Size and Shape

According to Rasa Ratna Samuchhaya, a Square pit should be prepared measuring about 2 hastas (36" or 91 cms) of depth, length and breadth. Rasa Taranginikara has mentioned the measurement of Mahaputa as Vyamardha (Half vyama). This measurement is same as that mentioned in Rasa Ratna Samuchhaya. 'Vyama is around 182 cms. (1 Vyama is the distance or length of the two hands in extended form)

Fuel and its Quantity

As per the Rasa Ratna Samuchhaya, 1500 Vanopalas are advised for Mahaputa in which 1000 Vanopalas should be filled in the pit before placing the musha or Sharava samputa while 500 Vanopalas are filled after keeping the musha or Sharava samputa in it. According to Sharangadhara samhita, the quantity of fuel mentioned is 30 vanopala.

Mode of Heating

Place the musha or Sharava samputa after filling the two-thirds of the pit with vanopalas. Then remaining vanopalas are filled and ignited. After complete burning of the cowdung cakes, allowed for self cooling and the material inside the musha or sharava samputa is collected. In this puta, intense heat is maintained for a longer time. As the quantity of the fuel used is more, it needs longer time to burn. Thus the material subjected to this puta remains in contact with the fire for a longer time.

Utility

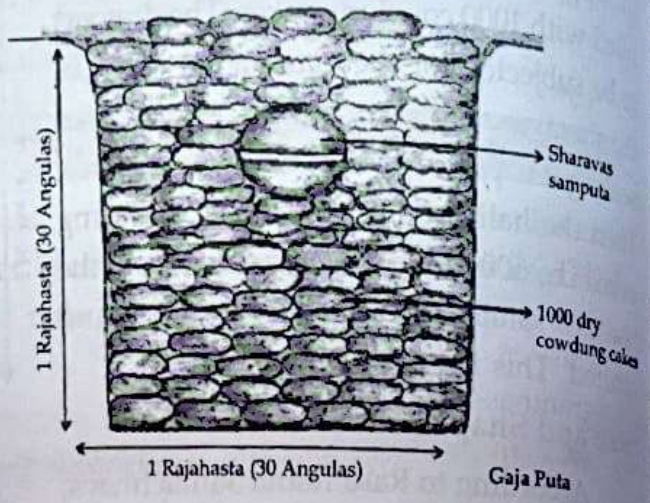
Maha puta is used in the marana of Abharaka, Vaikranta and other hard dravyas.

Gaja Puta

Gaja is elephant. This is bigger puta, but smaller than Mahaputa.

राजहस्तप्रमाणेन चतुरस्रंच निम्नकम्। पूर्णञ्चोपलसाठिभिः कण्ठावध्यथ विन्यसेत्।
विन्यसेत् कुमुदीं तत्र पुटनद्रव्यपूरिताम्। पूर्वाच्छगणतोऽर्धानि गिरिण्डानि विनिक्षिपेत् ।
एतद् गजपुटं प्रोक्तं महागुण विधायकम्। (R.R.S.10/53-54)

नृपकारचतुरस्रोत्सेधदैर्घ्यं तु कुण्डे छगणगणभृतार्द्धं मूषिकां स्थापयित्वा।
पुटनमिह भवेद्यच्छाणपूर्णेऽर्द्धभागे गजपुटमिह तन्त्रे भाषितं तद्रसज्ञैः।। (R.T.¾0)



A square pit of 1 Rajahastha (22") measurement in length, breadth and depth is made and cowdung cakes are filled upto its neck (2/3rd). Then the sharava samputa or musha filled with dravyas for marana is placed over the cowdung cakes and half the number of cowdung cakes are filled in the pit and ignited. This is called Gaja puta.

Size and Shape

According to Rasa Ratna Samuchhaya, square pit should be prepared having a length, breadth and depth of one Raja hasta (22" or 58.5 cms) pramana. The author of Rasa Tarangni has mentioned the size of Gajaputa as Nrupakara hasta in place of Rajahasta (22"). As per Rasa Prakasha Sudhakara, the size of Gajaputa should be 1 hasta (18") length, breadth and depth. According to the Ayurvedic formulary of India the size of Gaja puta should be 90 cms.

Fuel and its Quantity

Only one reference is found in Rasa Prakasha Sudhakara that 1000 Vanopalas are to be used in Gaja puta. Other Acharyas have instructed the measurement of the pit and to fill the vanopalas in that pit.

CHAPTER FIVE

Mode of Heating

After filling 2/3rd part of the pit with cowdung cakes the sharava Samputa or musha is kept and remaining ⅓rd part is filled with cowdung cakes to cover the Sharava Samputa or musha and then ignited. After complete burning, allowed for self cooling and the next day sharava Samputa or musha is taken out for collecting the material.

Utility

Gaja puta is used in the marana of hard dravyas like Abhraka, Tamra, Loha and others.

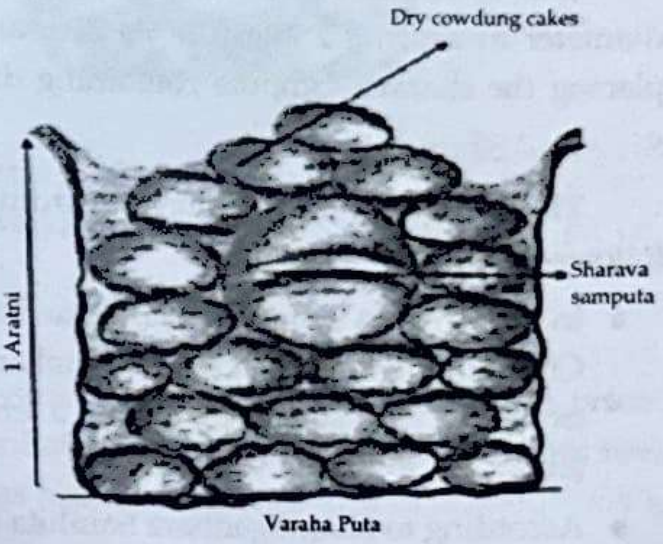
Varaha Puta

Varaha is pig and puta smaller then Gajaputa is varaha puta.

इत्थं चारत्निके कुण्डे पुंट वाराहमुच्यते ।। (R.R.S.10/55)

कुण्डे त्वरत्निमानेन चतुस्रे तथोच्छ्रिते। पुटं यद् दीयते तत्तु वाराहपुटमच्यते।। (R.T. ¾1)

A square pit is made which it measuring 1 Aratni (10 ½") in length, breadth and depth. After filling the pit with cowdung cakes upto its neck (2/3rd), the sharava samputa containing dravya is placed over it and remaining part of the pit is filled with cowdung cakes and ignited. This is known as Varaha puta.



Varaha Puta

Size and Shape

- The square pit should measure about 1 aratni pramana (10 ½" or 41.9 cms) as mentioned by all the Rasa granthas.
- According to Rasayana Sara, the measurement of Varaha puta is half of the Gajaputa.
- In Ayurvedic formulary of India, the measurement of Varaha puta is mentioned as 60 cms (length, breadth and depth).

Fuel and its Quantity

Vanopalas are used as fuel in the Varaha puta. The number as such is not mentioned in any of the classical reference. Only the commentators have mentioned that 500 (350 below 150 above the sharava samputa) vanopalas/cowdung cakes to be used in Varaha puta.

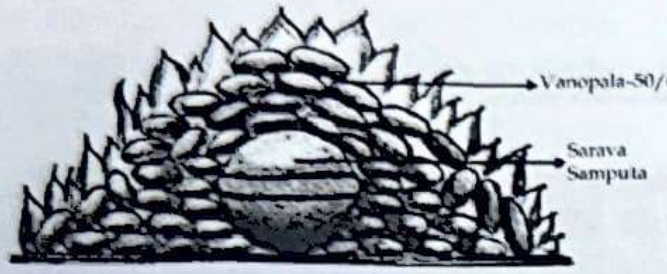
Utility

Varaha puta is used in the marana of Kaparda, Shukti and other such dravyas.

Kukkuta Puta

Kukkuta is cock. Puta is smaller than varaha puta but bigger than kapota puta.

वितस्तिद्वयमानेन निम्ने च चतुरस्रके। पुटं यद्दीयते तत्तु मतं कुक्कुटकं बुधैः।। (R.T.3/42)



Kukkuta Puta

Square pit with the measurement of 2 vitasti (18") in length, breadth and depth is made and filled with cowdung cakes upto neck (2/3rd) of the pit, after placing sharava samputa containing the dravya over it, remaining part of the pit is filled with cowdung cakes and ignited. This is called kukkuta puta.

पुटं भूमितले, तत्तद्वितस्तिद्वितयोच्छ्रयम्। तावच्च तलविस्तीर्णं तत्स्यात्कुक्कुटकं पुटम्।। (R.R.S.10/56)

The cowdung cakes are placed on bhoomitale (the surface of the earth) with diameter measuring 2 vitasti at its base and heaped up to the height of 2 vitasti after placing the sharava samputa containing dravya on the surface of earth.

Size and Shape

There are different opinions regarding the size of the kukkuta puta which are as follows-

- In Rasa Ratna Samuchhaya, Rasa Tarangini, Bhruhat Rasa Raja Sundara, Rasa Chintamani, Rasa Prakasha Sudhakara and Rasa Jala Nidhi, the size and shape is explained as, a square pit having a length, breadth and depth of 2 Vitasti pramana (about 18" = 46.7 cms).
- According to Sharangadhara Samhita for preparing Swarna Bhasma, Kukkuta puta is advised where it has been told to use 5 vanopalas.
- As per Bhavaprakasha, the size of Kukkuta puta is 1 Vitasti pramana (9" or 22.8 cms).
- Bhavaprakasha, in another context mentioned the size of puta as 16 angulas.
- According to Dhanvantari Samhita, 6 Angulas is the measurement of Kukkuta puta.

Fuel and its Quantity

Vanopalas are used as fuel in kukkuta puta. In one reference, 10 vanopalas has been mentioned and other Acharyas have not mentioned the quantity of vanopalas to be used in Kukkuta puta. But have mentioned the size of the pit. Inferring from this number of vanopalas which can fill such pit has to be used.

Mode of Heating

2/3rd of the pit is filled by vanopalas, keep the sharava samputa containing the dravya over it and then remaining ⅓rd of the pit is filled with the vanopalas over the sharava samputa. Later Vanopalas are subjected to fire, allowed for complete burning. After swangasheeta, dravya inside the samputa has to be collected.

Utility

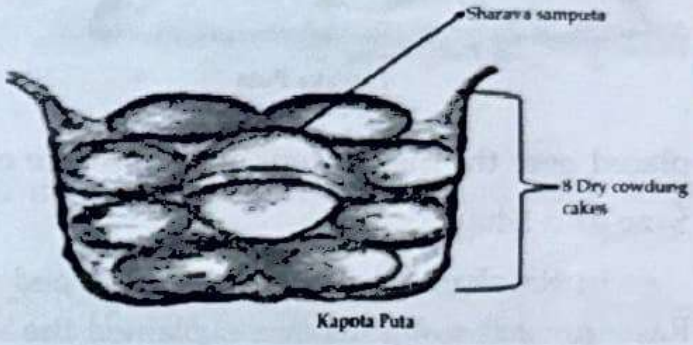
Kukkuta puta is used in the marana of mrudu dravyas like Swarna, Rajata etc.

Kapota Puta

Kapota is dove/pigeon. Kapota puta is the smaller puta which is also called as Laghu puta

यत्पुटं दीयते भूमावष्टसंख्यैर्वनोपलैः।
बद्ध्वा सूतार्कभस्मार्थं कपोतपुटमुच्यते।।
(R.R.S.10/57)

वन्योत्पलैरष्टसंख्यैः क्षिप्तौ यद्दीयते पुटम्।
रसादीनान्तु सिद्ध्यर्थं तत्कपोतपुटं स्मृतम्।
(R.T.¾3)



Kapota Puta

Kapota puta is the puta given using 8 vanopalas (cowdung cakes) by placing sharava samputa containing rasa and other dravyas in the midst of vanopalas. These 8 vanopalas can be placed inside the pit or can be heaped up on the ground.

Size and Shape

Pit is not mentioned in most of the classics. 8 vanopalas are mentioned to place over the ground and ignite. The Author of Brihat rasa raja sundara explains about the pit of one vitasthi pramana and 7-8 vanopalas should be placed in it.

Fuel and its Quantity

8 vanopalas

Mode of Ignition

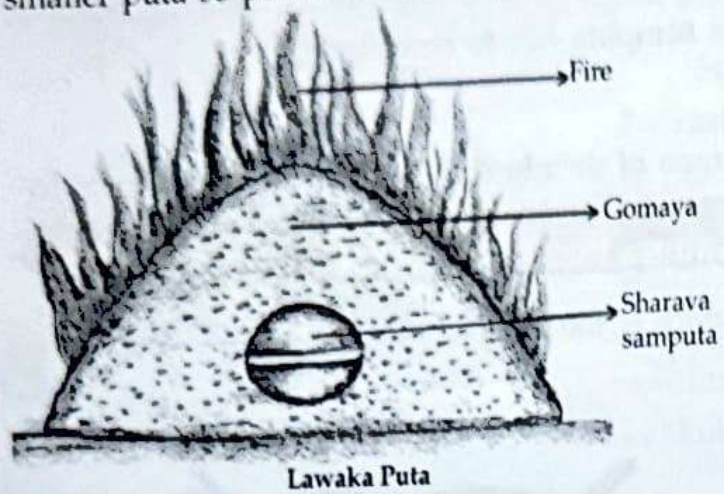
Four vanopalas should be placed over the ground and the Sharava samputa or musha containing dravya is placed over those Vanopalas and remaining 4 cow dung cakes are used to cover that Sharava samputa or musha. Vanopalas are ignited, allowed for complete burning and after swangasheetata the Sharava samputa or musha can be taken out.

Utility

Kapota puta is used in the preparation of Parada bhasma and marana of Mrudu dravyas.

Lawaka Puta

Lawaka is the small bird. As this is a small puta, it is named after that bird. It is smaller puta so produces relatively lower temperature of heat.



Lawaka Puta

ऊर्ध्वंषोडशिकामात्रैस्तुषैर्वा गोवरैः पुटेत्।
यत्र तल्लावकाख्यं स्यात्सुमृदुद्रव्यसाधनेषु।। (R.R.S.10/63)

गोवरैर्वा तुषैर्वापि वितस्त्यूर्ध्वं पुटेन्नु यत्।
मृदुद्रव्यप्रसिद्ध्यर्थं तल्लावकपुटं मतम्।। (R.T.)

In lawaka puta, shodashika matra (1 pala - 48 gms) of dry cowdung powder or husk is used as fuel. The cowdung powder or husk is placed over the musha kept on the surface of the earth in the form of heap and ignited.

Size and Shape

In Rasakamadhenu, it has mentioned to prepare a small pit of Lavaka bird size. Rasendrasara sangrahakara explained the size of the pit as one vitasthi pramana.

Fuel and its Quantity

Gorvara churna or Tusha has been told as a fuel by almost all the RasAcharyas. The quantity mentioned by Rasaratna samuchaya, Rasa Tarangini and Rasaprakasha Sudhakara is one Shodashika matra or one pala (48 gms). In Rasakamadhenu, Rasa jalanidhi and Rasa Chikitsa, it has explained to use Gorvara churna or tusha of 2 times that of dravya.

Mode of Heating

2/3rd (32 gms) of Gorvara churna or tusha is placed over the ground and Sharava samputa containing the dravya is kept over the heap. Remaining ⅓rd (16 gms) of gorvara churna or tusha is spread over the Sharava samputa. The fuel is ignited, allowed for complete burning and Sharava samputa is collected after self-cooling.

Utility

It gives very low temperature and may be used for highly soft type of mineral drugs having very low melting point.

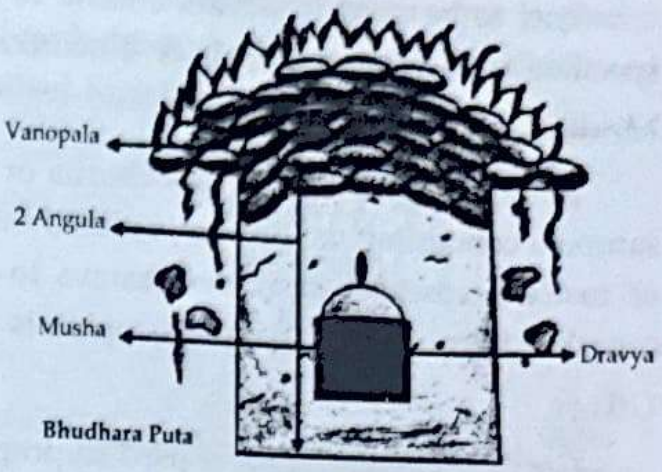
Lawaka puta is useful in the marana of mrudu dravyas (soft materials).

Bhudhara Puta

वह्निमित्रा क्षिप्तौ सम्यक निखन्याद् द्वयङ्गुलादधः। उपरिष्टात्पुटं यत्र पुटं तद्भूधराह्वयम्।। (R.R.S.10/62)

भूमिगर्ते कुमुदिकां विन्यस्य द्वयङ्गुलोपरि। यद् दीयते पुटं तत्तु पुटं भूधरसंज्ञकम्।। (R.T.3/47)

A pit of 2 Angula depth is dug inside the earth. Musha or sharava samputa containing dravyas is kept inside it and pit is filled with the mud or the sand. Then the heat is given from the above by placing the cowdung cakes over it and ignited. This is called Bhudhara puta.



As the musha containing dravyas are buried inside the earth, it is called as Bhudhara yantra. Here, number of cowdung cakes are not specified. So, depending upon the hardness of the dravya, number of cowdung cakes can be taken.

Utility

Bhudhara puta is used in the marana of Parada, Gowripashana and other such dravyas.

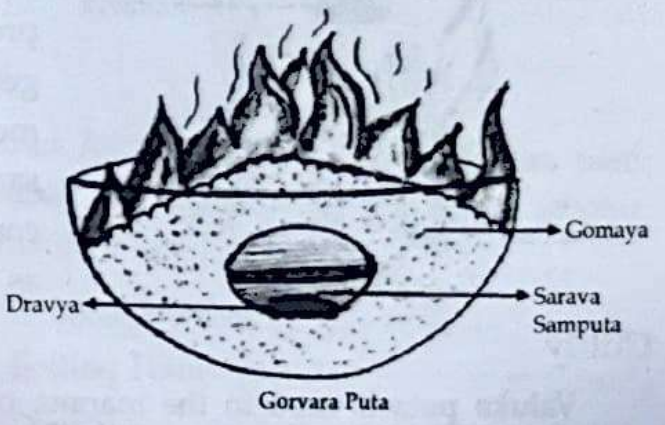
Gorvara Puta

Gorvara puta is also known as Gorvaa puta.

तुषैर्वा गोमयैर्वापि रसभस्म प्रसाधनम्। मानिकाद्वय मानेन गोर्वरं पुटमुच्यते।। (R.P.S. 10/47)

This is a type of puta where the powdered cowdung or the husk is used as fuel. According to Rasa Prakasha Sudhakara, the quantity of fuel to be taken is two manika (768 gms).

गोवरैर्वा तुषैर्वापि खलु कुण्डेऽथवा क्षितौ।
पुटं यद्दीयते विज्ञैस्तद् गोर्वरपुटं स्मृतम्।। (R.T. 3/44)



Dried cowdung powder or husk is filled in the big vessel in which sharava samputa containing the dravya is placed in the middle of it. It is ignited and allowed for complete burning. Such puta is known as Gorvara puta.

As the name indicates, Gorvara choorna (Cowdung powder) is used in this puta as fuel instead of vanopalas.

Size and Shape

In majority of Rasa classics, the size and shape of the puta is not mentioned. In Rasatarangini, it is mentioned to be placed in a bhanda or pit.

Fuel and its Quantity

Fuel to be used is Govara churna or tusha. And the quantity of Govara churna specified is 64 tolas or 16 pala or 2 manikas.

Mode of Ignition

Initially 40 tolas of Gorvara churna or tusha is placed on the ground and Sharava samputa containing the dravya is placed over it. Remaining 24 tolas of Gorvara churna or tusha is spreaded over the Sharava to cover it. Then fuel is ignited, allowed for complete burning and Sharava samputa is collected after self-cooling.

Utility

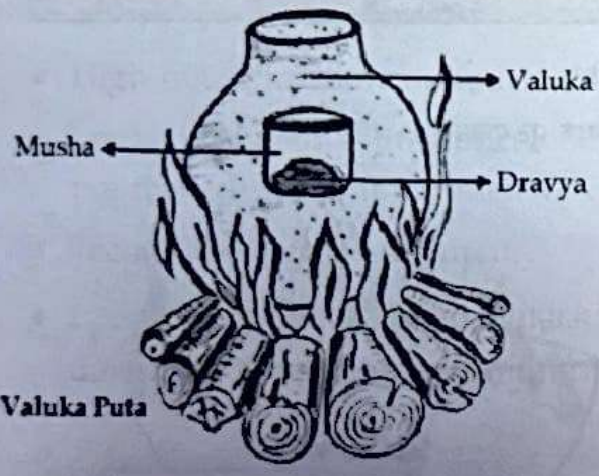
Gorvara/Gomaya puta is used to prepare Rasa bhasma.

Valuka Puta

Valuka is sand and in this puta, valuka is used as medium to provide uniform heat. Hence called as valuka puta.

अधस्तादुपरिष्टाच्च क्रौञ्चिकाऽऽच्छाद्यते खलु। वालुकाभिः प्रतप्ताभिर्य प्रतद्वालुका पुटम्। (R.R.S.10/61)

प्रतप्तवालुकागर्भे न्यस्य मूषादिकं दृढम्। यद् दीयते पुटं तत्तु वालुकापुटमुच्यते।। (R.T.3/46)



Sand is filled upto the half portion of the pot, then dravyas filled in the musha and sealed is placed over it and remaining portion of the pot is filled with the sand. Later heat is provided from the below by which the sand gets hot and in turn heating dravyas inside the musha. Another method is described where hot sand is filled in the pot by placing the musha containing dravya in the center. This is known as Valuka puta.

Utility

Valuka puta is used in the marana of Haratala, Gowripashana and other such dravyas.

Kumbha Puta/Bhanda Puta

This puta is also called as Bhanda puta or Mrdbhanda puta. As the puta is given in the pot instead of pit, this is called as kumbha puta. This puta provides a low intensity of heat.

स्थूलभाण्डे तुषापूर्णे मध्ये मूषासमन्विते।वह्निना विहिते पाके तद्भण्डपुटमुच्यते।। (R.R.S.10/60)

मूषागर्भे तुषापूर्णे स्थूले भाण्डेऽग्नियोजनात्। दीयते यत्पुटं विज्ञैस्तद् भाण्डपुटमुच्यते।। (R.T.3/45)

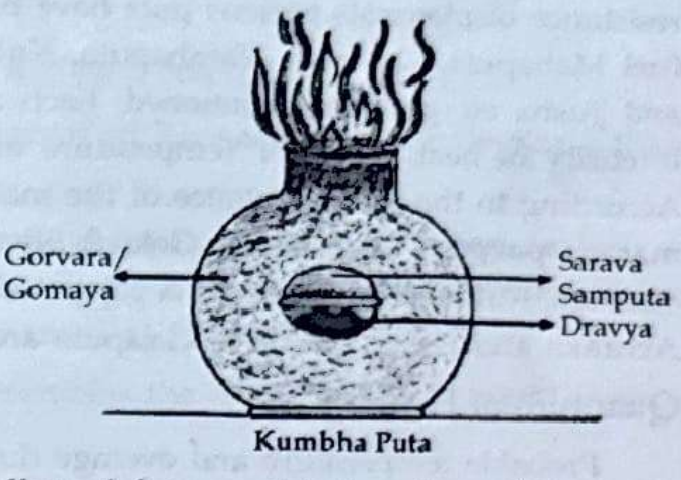
Half of the pot is filled with the dry husk, musha containing dravyas is placed over it and remaining part of the pot is filled with the husk. This is ignited and allowed for complete burning of the husk. This is called Kumbha puta.

Size and Shape

Pot of required dimension.

Fuel and its Quantity

Tusha (husk) completely filled inside the pot.



Kumbha Puta

Mode of Ignition

The pot is half filled with the dry husk and musha containing dravyas is placed over it and remaining part of the pot is filled with husk. Then ignited and allowed for complete burning of the husk, later left for self cooling and material inside the musha was collected.

Utility

Kumbha puta is used in the marana of Haratala, Gowripashana and other such dravyas.

Anukta Puta

अनुक्त पुटमाने तु साध्य द्रव्य बलाबलात्।
पुटं विज्ञाय दातव्यमूहापोहविचक्षणैः।। (R.R.S.10/64)

If the puta is not specified in the classics for the marana of the dravyas, then considering the hardness of the dravyas, suitable puta has to be selected by the scholar after proper assessment and judging using his own intelligence.

The following factors should be taken for consideration:

- The Relative Weight
- Hardness
- Specific Gravity
- Melting Point
- Boiling Point
- Density
- Fusibility (Liquefaction) etc.

Principle Involved in Puta

Various grades of heat is required for different kinds of metals and minerals according to their physical and chemical characters. Hence Putas are designed to provide the quality of correct temperature for particular duration for preparing Bhasmas. Quantum of fuel has been set for different types of puta which provides different grades of temperature required for the marana of different metals and minerals.

Importance of Temperature

Puta is a specific system of heating for the incineration of metals and minerals. For the hard, soft, organic, inorganic, volatile, inflammable and according to heat resistance of materials various puta have been described. According to the quantity of fuel Mahaputa, Gajaputa, Varahaputa, Kukkutaputa, kapotputa, Gorbarputa, Bhanda and Tusha etc puta are mentioned. Each and every puta have different dimensions. Intensity of heat, Mode of Temperature and Time duration depends upon the puta. According to the heat resistance of the material, puta are selected and applied for the marana purpose, Such as, for Gold & Silver Laghu or Kapota puta; for Vanga, Naga, Yashada, Kukkuta puta or Ardha gajaputa; for Tamra, Varaha or kukkuta puta and for Abhraka and Loha, Varaha or Gajaputa are applied.

Quantum of Heat

Probable temperature and average duration of heat of the different putas can be as below :

S.No.	Type of Puta	Average Duration	Average Peak Temperature
1	Maha puta	10 hrs	1000°C
2	Gaja puta	8 hrs	800-1000°C
3	Varaha puta	6 hrs	800°C
4	Kukkuta puta	6 hrs	200-250°C
5	Kapota puta	3 hrs	125°C
6	Gobara puta (Gorvara churna)	13 hrs	400°C
7	Gobaraputa (Tusha)	16 hrs	350°C
8	Lavaka puta (Gorvara churna)	2 hrs 30 mins	75°C
9	Lavaka puta (Tusha)	4 hrs 30 mins	150°C

Currently used heating devices and Instruments used in Large scale Production

Now a days Muffle furnace/Programmed muffle furnaces are used in small scale and large scale production.

Musha

Introduction

During satwapatana and other processing of metals and minerals, they need to be subjected to intense heat. For this purpose, utensils which are more resistant to heat and sustain high pressure are required to be designed, so that they will not break or crack by subjecting into high temperature of heat. To fulfil this purpose, our Acharyas designed a special equipment called Mushas.

Nirukti

मुष्णाति दोषान् मूषेयान् सा मूषेति निगद्यते। (R.R.S.10/2)

Mushas are those which eradicates doshas (defects/impurities) from the drugs.

Synonyms

मूषा हि क्रौंचिका प्रोक्ता कुमुदी करहाटिका। पाचनी वन्हिमित्रा च रसवादिभिरीर्यते।। (R.R.S.10/1)

The synonyms of musha told by RasAcharyas are Krounchika, Kumudhi, Karahatika, Pachani, Vahnimitra

1. **Krounchika-** Mushas are prepared from the soil available in Krouncha hill, so they are called Krounchika and also the shape of the Musha resembles the shape of the Krouncha bird, so mushas are named as Krounchika
2. **Kumudi-** The shape of the Musha resembles the shape of the kumuda Pushpa (Lotus bud), so termed as Kumudi
3. **Karahatika-** Mushas are also prepared from the soil present in the karahata desha, hence the name Karahatika
4. **Pachani-** Mushas are used for the purpose of heating, therefore they are named as Pachani
5. **Vahnimitra-** Mushas are called Vahnimitra signifying the meaning of friend towards fire as they can withstand high temperature of heat without breaking or getting crack.

Musha Preparation

Materials Required

उपादानं भवेत्तस्या मृत्तिका लोहमेव च। (R.R.S.10/3)

The basic things required for the preparation of Mushas are Mud and the Iron powder.

Properties Mud

मृत्तिका पाण्डुरस्थूला शर्करा शोणपाण्डुरा।
चिराध्मानसहा सा हि मूषार्थमतिशस्यते।
तदभावे च वाल्मीकी कौलाली चा समीर्यते।। (R.R.S.10/6)

The characteristics of mud suitable for the musha preparation are Pandura (yellowish white colour), Sthula (Stout), Sharkara (with small granules) and able to with stand the intense heat for longer duration. This type of mud is best for the preparation of Musha. In absence of such type of mud, ant-hill soil or Pot makers soil would also serve the purpose.

Above mentioned type of mud is taken along with other materials like charcoal powder, burnt husk and others, pounded well till the desired consistency obtained.

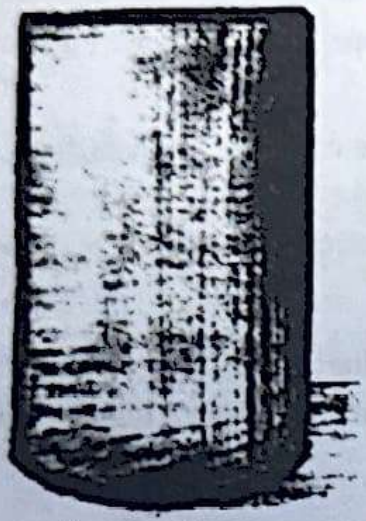
With this, mushas are prepared with desired shape and size, dried well and baked to make it strong and heat resistant.

There are different types of mushas mentioned in our classics which are named based on their structure, shape, purpose and the materials used.

Samanya Musha

If the musha is not specified, Samanya musha can be used in general and if the materials are not specified, the materials told for the Samanya musha can be taken.

या मृत्तिका दग्धतुषैः शणेन शिखित्रकैर्वा हयलद्दिना च।
लौहेन दण्डेन च कुट्टिता सा साधारणा स्यात्खलु मूषिकार्थे।। (R.R.S.10/7)



Samanya Musa

Materials Required

1. Mrittika (suitable mud)
2. Dagdhatusha (burnt husk)
3. Shana (Jute fibres)
4. Shikitraka (Charcoal powder)
5. Hayaladdhi (Horse dung)

All the above materials are mixed together and pounded well with the iron rod to yield the desired consistency. This mixture is used to prepare musha of desired shape and size. Prepared mushas are dried and baked. These are called Samanya Musha.

Shape

Desired shape

Utility

These are used for the Satvapatana of the drugs which requires lesser quantum of heat.

Principle Involved

Musha is designed to withstand the highest temperature and sustain high pressure encountered in the process of Satwapatana, so that they will not break or crack even by subjecting into high temperature of heat. They are prepared by different things of unique combinations to make them more thermostable and remain inert to the reactions happening inside them.

Currently used Instruments and Instruments used in Large scale Production

Crucibles of varied sizes made of Porcelain, Silica, platinum etc.,

Crucibles

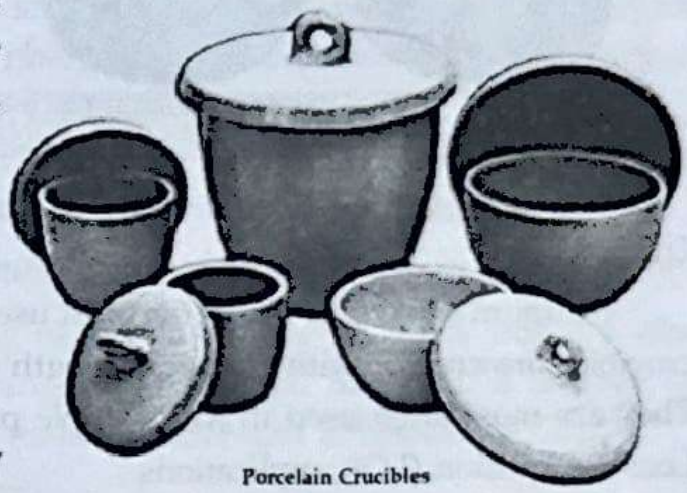
Crucible is a type of laboratory equipment that is usually a cup shaped, made of porcelain or non reactive metal which are used to heat chemical compounds to very high temperature. Modern crucibles may be small laboratory utensils for conducting high-temperature chemical reactions and analyses or large industrial vessels for melting and calcining metal and ore. Crucibles and their covers are made of high temperature resistant materials, usually porcelain, alumina, clay- graphite, silicon-carbide or an inert metal.

A crucible is used to keep metals for melting in a furnace. Furnace crucibles are designed to withstand the highest temperatures encountered in the metal casting works. The crucible should essentially be made of materials with a much higher melting point than that of the materials to be melted. The crucible materials should also have good strength even when extremely hot. Crucibles are also used for chemical analysis and to prepare flux fusions for XRF analysis.

Porcelain Crucibles

Economical glazed porcelain crucibles are accompanied with lids. They are made from high purity raw material and are designed to with stand sudden temperature changes without cracks or deformation. Features are :

- Good chemical and acid resistance
- Can be used to up to 1050°C (1922°F)
- Low cost



Porcelain Crucibles

Utility

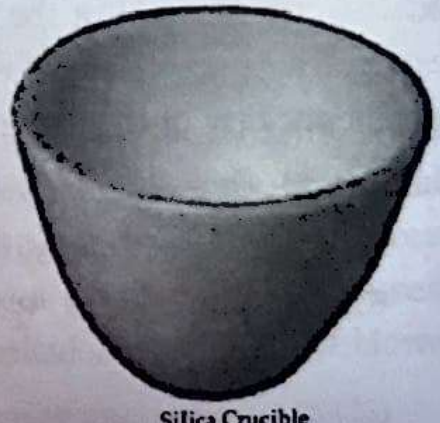
- Porcelain crucible is useful in many laboratory processes for heating purpose

Silica Crucible

These are made of pure fused silica. Silica crucible can withstand high temperature and chemical corrosion compare to porcelain crucible.

Features are:–

- Can be used to upto 1120°C.
- It has a very low co-efficient of thermal expansion, which allows rapid heating and cooling with virtually no risk of thermal breakage.
- They are unaffected by all halogens and acids.



Silica Crucible

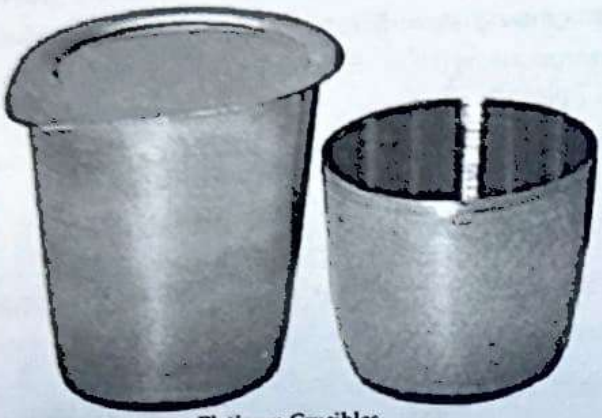
- They are chemically inert and gives non- contaminated results.

Utility

They are used for metal casting and all ordinary purposes. These are efficient for use as laboratory crucible as well as in industrial applications.

Platinum Crucible

Platinum exhibits excellent resistance to chemical reactions and has a high melting point. Platinum is widely used for chemical analysis. Features are:



Platinum Crucibles

- Can be used from upto 1600°C
- Maintains strength at higher temperatures
- Virtually chemically inert
- Resist oxidization in air
- High corrosion resistance against acids and melted salts
- These crucibles possess high temperature strength and oxidation resistance in air and oxygen; and also corrosion resistance in acids and melted salts.

Utility

Platinum crucible is one of the most useful tools of the analytical chemist. Platinum crucibles are created with enough strength necessary for use in a chemical laboratory. They are most often used in XRF sample preparation, ash testing, wet chemistry, and Loss on Ignition (LOI) applications.

Mudra

Mudras are the sticky substances used to seal the mushas and its lid or the kupi and the cork. These are the adhesive substances which gets hardened with further heating. There are different types of mudras mentioned in our classics with different ingredients. Few of them are:

Madana Mudra

औदुम्बराख्यवटदुग्धपलं पलञ्च, लाक्षा पलमृषिपलं त्वथ चुम्बकस्य।
सङ्कट्यमानमतसीफलतैलमिश्रं, सूतस्य जारणविधौ मदनाख्यमुद्रा।। (A.K.)

Ingredients

1. Udumbaraksheera - 1 pala
2. Vataksheera - 1 pala
3. Laksha rasa - 1 pala
4. Chumbakaloha churna - 7 pala

All the above ingredients are taken in their specified quantity, mixed and pounded thoroughly by mixing the required quantity of Atasi taila till the smooth and sticky consistency attained. This mixture with desired consistency can be used for sealing the joining ends of the equipments while doing parada jarana and other pharmaceutical processing of rasa dravyas.

Hata Mudra

चुम्बकं लोहचूर्णं च क्रोडरक्तेन संयुतम्। तत्र सर्वं प्रदातव्यं घनघातेन ताडयेत्।।
सन्ध्यारभ्योदयो यावत्सूर्यबिम्बं च दृश्यते। हठमुद्रेति विख्याता सर्वसिद्धैर्नमस्कृता।। (A.K.)

Chumbakaloha churna is mixed with the required quantity of Krodarakta (Pig's fresh blood) and pounded vigorously from sunset to sunrise (around 12 hours). Then the mixture will attain the consistency of smooth and sticky, which can be used for the purpose of sealing during all types of pharmaceutical processing of Rasa dravyas.

Sandhi Bandana

मूषापिधानयोर्बन्धे बन्धनम् सन्धिलेपनम्। अन्ध्रणं रन्ध्रणं चैव सश्लिष्ट सन्धिबन्धनम्।। (R.R.S. 10/5)

मूषादीनां तु यत्सन्धौ किट्टाद्यैः स्याद्विलेपनम्। तत्सन्धिलेपनं ख्यातं तच्चोक्तं सन्धिबन्धनम्।। (R.T.3/5)

Sandhibandana is a process of sealing of musha and its pidanaka (lid). It is also called by the name Sandhi lepana, Andrana, Randrana and Sanslista. It is done by mixing lohakitta with other substances to make it sticky and adhesive.

Sandhi Bandhana Material

Sandhibandana can also be done by Mudras and Mritlepita vastra.

सरसां गूढवक्त्रां मृद्वस्त्राङ्गुलधनावृताम्। शोषितां काचकलशीं त्रिषु भागेषु पुरयेत्।। (R.R.S. 9/36)

Koshthi

Introduction

Rasashastra includes various methods of preparation of medicines. Many of the methods requires fire for the preparation of medicines and processing of the rasadravyas. Koshthi is one of the instruments which is used to provide heat for such processes. It is a specialized fire place where intense heat could be applied with the help of blowers.

सत्वानां पातनार्थाय पातितानां विशुद्धये। कोष्ठिका विविधाकारास्तासां लक्षण मुच्यते।। (R.R.S. 10/32)

Definition

For the purpose of extraction of Satva from the ores and to purify the extracted Satva, heating appliances of different sizes and shapes are needed. Such heating appliances are called as Koshthi.

सत्वादिपातनाद्यर्थं द्रव्यढालनसाधिका। वह्निसन्धानिका या तु कोष्ठिका सा निगद्यते।। (R.T. 3/24)

Koshti/Koshthika are the heating appliances which are used for the purpose of extraction of satva and for the dhalana. As koshthi is the closed chamber, heat will be trapped from all the four sides resulting in increasing the intensity of heat, hence it is also called as Vahnisandanika.

Chullika

Chullika is a heating apparatus used in different pharmaceutical processing. It can be prepared using stone, brick, soil, iron and other such materials.

अङ्गारधानिका।

अङ्गारधानिका ख्याता हसन्ती च हसन्तिका। अङ्गारशकटी चापि हसनी च निगद्यते।

अङ्गारधानिका ह्येषा मृदुद्रव्यप्रसाधिका। वङ्गादीनां ढालानादौ विशेषेण प्रयुज्यते।। (R.T.3/22-23)

It is also called as Angaradhanika, Hasanti, Hasantika, Angarashakati and Hasani

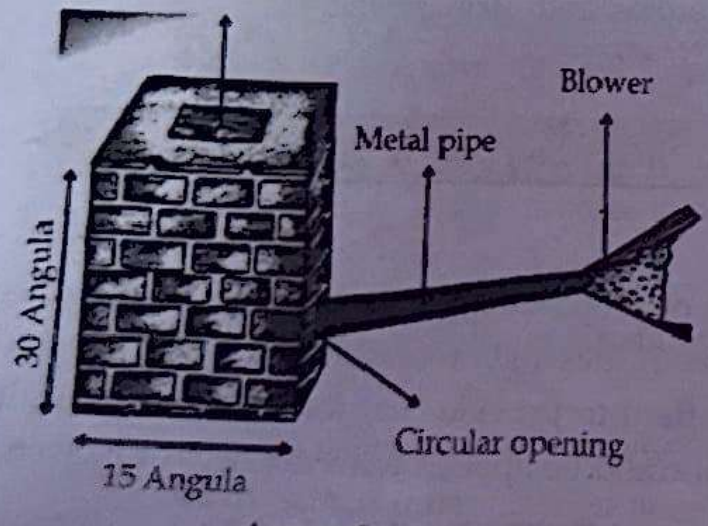
Utility

It is used for heating and melting of Mrudu dravyas

It is also useful in melting vanga and other similar mrudu dravyas before Dalana and other pharmaceutical processing.

Angara Koshthi

राजहस्तसमुत्सेधा तदर्धायामविस्तरा। चतुरस्रा च कुड्येन वेष्टिता मृन्मयेन च।।
एकाभित्तौ चरेद्द्वारं वितस्त्या भोगसंयुतम्। द्वारं सार्धवितस्त्या च संमितं सुदृढं शुभम्।।



Angara-kushti

देहल्यधो विधातव्यं धमनाय यथोचितम्।
प्रादेशप्रमिता भित्तिरुत्तरङ्गस्य चोर्ध्वतः।।
द्वारं चोपरि कर्तव्यं प्रादेशप्रमितं खलु।
ततश्चेष्टिकया रुद्ध्वा द्वारसान्धिं विलिप्य च।।
शिखित्रैस्तां समापूर्य्य धमेद्भस्त्राद्वयेन च।
शिखित्रान्यमनद्रव्यमूर्ध्वद्वारेण निक्षिपेत्।।
सत्त्वपातनगोलांश्च पञ्च पञ्च पुनः पुनः।
भवेदङ्गारकोष्ठीयं खराणां सत्त्वपातिनी।।

(R.R.S.10/33-38)

A quandrangular cabin is built on the surface of the earth using bricks and mud with the measurement of 1 Rajahasta (30

Angula) height, ½ Rajahasta (15 Angula) length and width inside and its inner and outer surface is plastered with soft clay on all sides. An opening is made at one wall of the cabin which measures 1 vitasti (12 Angula) in length and width. From this opening, at the distance of 1 pradesha (12 Angula) another strong opening is made inside the earth which measures 1½ vitasti (18 Angula) in length, width and depth. To this opening, 2 vankanalas can be attached on both side which are connected to blower for blowing.

Another opening is made on the top of this cabin which measures 1 pradesha (12 Angula) in length and width. The gap in between is sealed by smearing the mud plaster. The charcoal is filled into cabin from the top opening, ignited and blown through the blowers. Drugs to be heated are made into round balls and are placed inside the cabin through the top opening. Usually 5 such balls are placed at a time and air is blown through blowers. This is called Angara koshthi.

Utility

This koshthi is the biggest koshthi and used in the satwapatana of hard dravyas.

Principle Involved

In order to extract satwa from its ores, high grade of temperature is needed. So Koshtis are designed in such a way that heat will be trapped inside resulting in the intensified heat within.

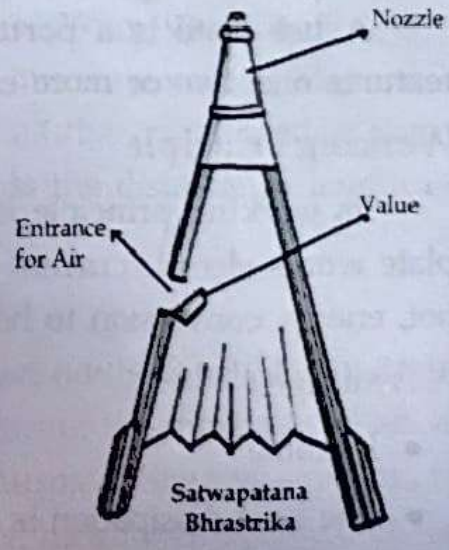
Currently used Instruments and Instruments used in Large scale Production

Furnaces and bio mass stoves are used nowadays and also for large scale production.

Satwapatana Bhashtrika

Satwapatana Bhashtrika is a device of a bellow or pair of bellows constructed to furnish a strong blast of air.

It consists of a flexible bag comprising a pair of rigid boards with handles joined by flexible leather sides enclosing an approximately airtight cavity which can be expanded and contracted by operating the handles, and fitted with a valve. They are used to deliver additional air to the fuel, raising the rate of combustion and therefore the heat output.



Principle Involved

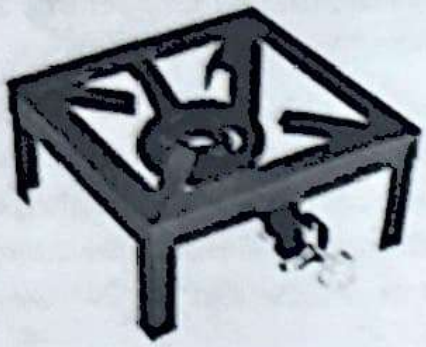
The bellows are designed allowing air to fill the cavity when expanded, and with a tube through which the air is forced out in a stream when the cavity is compressed.

Utility

It is used in particular blowing on a fire to supply it with air in Koshthi and other heating devices.

Gas Stove

A gas stove is a stove that is fueled by combustible gas such as syngas, natural gas, propane, butane, liquefied petroleum gas or other flammable gas.



3 Parts : Gas source, regulator and stove

Working Principle

A gas stove burner consists of a burner assembly attached to a small gas valve that is connected to the main gas line. By turning the knob to a higher heat setting, the flow of gas and air increases, and the flame gets larger. Gas burners can work with either natural gas or propane.

Advantages

- Convenient to use
- Convenient for cleaning
- Instant heat control
- Less pollution

Disadvantages

- Chances of leakage of gases and accidents
- Needs regular checkup and parts replacements

Utility

- Preparation of kashayas
- Can be used in some shodhana procedures like swedana, dalana, nirvapa, bharjana
- Preparation of parpati

Hot Plate

A hot plate is a portable self-contained tabletop small appliance cooktop that features one, two or more electric heating elements or gas burners.

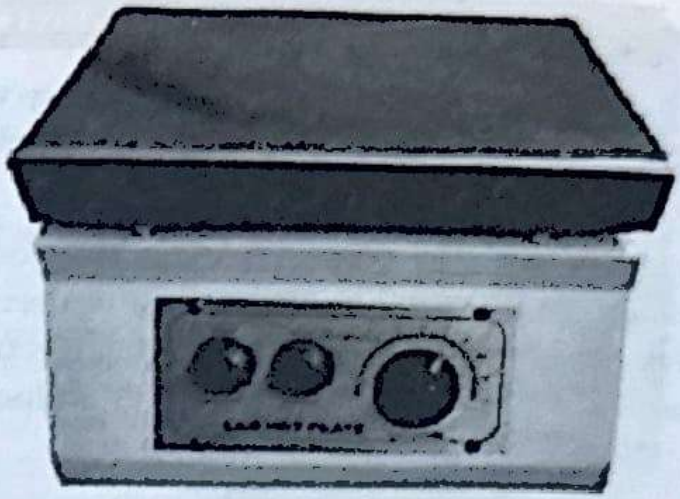
Working Principle

Its working principle is very simple, simple is the electric effect. Electric heating plate works electric current through the electric alloy wire, electric alloy wire will be hot, energy conversion to heat, and conduction to the outer shell.

Advantages

- Portable
- The heat dissipation is uniform

- Easy to install and easy to operate
- Less expensive
- No open flame, good security,
- No odor
- No need of regular check up and replacing parts like gas stove
- Applicable to a variety of working conditions.



Disadvantages

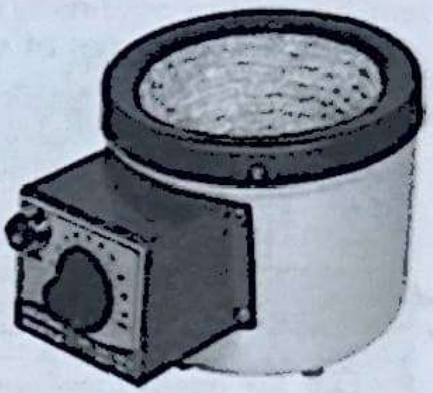
- Electricity is must
- Slow heating

Utility

- Preparation of kashayas
- Can be used in some shodhana procedures like swedana, dalana, nirvapa, bharjana

Heating Mantle

Heating mantle is a piece of laboratory equipment used to apply heat to containers, as an alternative to other forms of heat bath. These mantles enclose a heating element in a series of layers of fiber glass cloth.



Advantages

- Safe as there is no open fire
- Uniform heating, so glass container can be heated directly.
- No liquid dropping as in water bath
- Exhibit less tendency to generate harmful hotspots

Disadvantages

- Limited use
- Different size glassware requires different mantle
- Slow heating and gives less temperature
- Difficult to stir during procedure

Utility

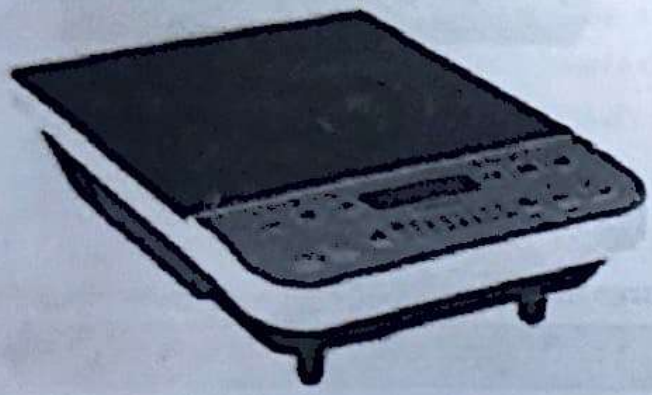
- Heating mantles are commonly used for heating round-bottomed flasks, reaction kettles and related reaction vessels.
- Used in the Preparation of arkas
- Used for the extraction of alcohol and water soluble extract

Induction Stove

Induction cooking heats a cooking vessel by electrical induction, instead of by thermal conduction from a flame, or an electrical heating element.

Working Principle

An induction cooktop uses an electromagnetic field to heat up a pan. An induction hob contains a coil of copper wire underneath the ceramic plate, and when a cooking vessel is placed on top an alternating electric current is passed through it. The resulting oscillating magnetic field wirelessly induces an electrical current in the vessel.



Advantage

- Safe and fast heating
- Easy to operate and clean
- Less wastage of heat and will not heat up the kitchen or pan leaving the cooking area.
- Changes in heat settings are instantaneous.

Disadvantage

- Electricity is must
- Only certain types of vessels with flat bottom can be used

Utility

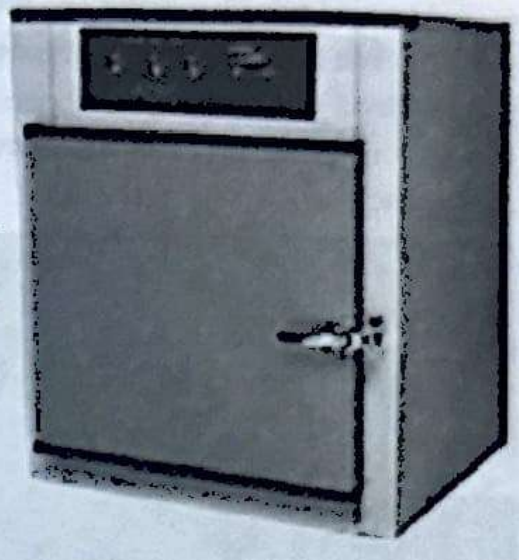
- Used for the preparation of kashayas
- Can be used for swedana procedure

Hot Air Oven

Hot air ovens are commonly used in the laboratory to remove water or other solvents from chemical samples and to dry laboratory glassware.

Working Principle

Hot air ovens are electrical devices which use dry heat to sterilize. Generally, they use a thermostat to control the temperature. Their double walled insulation keeps the heat in and conserves energy, the inner layer being a poor conductor and outer layer being metallic. There is also an air filled space in between to aid insulation. An air circulating fan helps in uniform distribution of the heat. These are fitted with the adjustable wire mesh plated trays or aluminum trays and may have an on/off rocker switch, as well as indicators and controls for temperature and holding time.



Advantages

- Easy to install and use
- Nontoxic
- Pollution free
- No much pressure build up within the oven, unlike an autoclave, making them safer to work.
- They are much smaller, effective and more rapid than an autoclave

Disadvantages

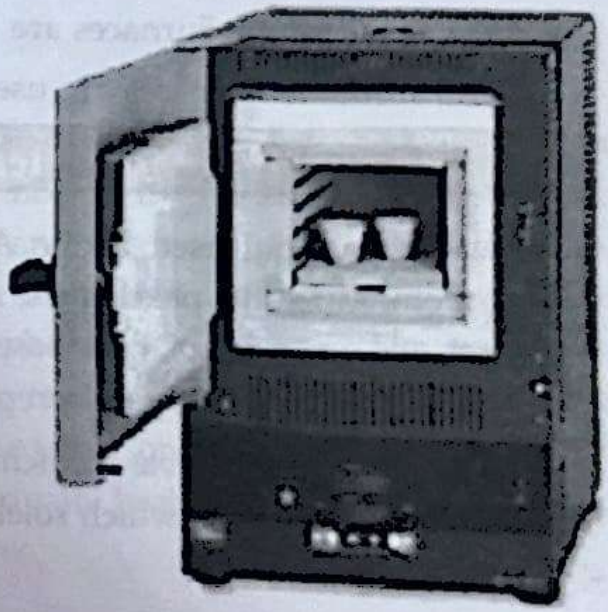
- Electricity is must
- Time consuming

Utility

- It is used to sterilize the equipment and for delivering the heat treatment to the product.
- Used to determine moisture content and ash value
- Used to dry vati, churna and others

Muffle Furnace– Horizontal and Vertical

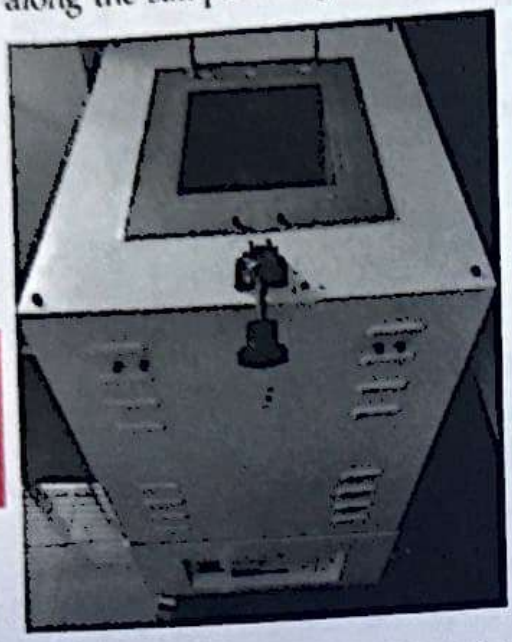
Muffle furnace is one of the simplest furnaces. It is an oven-type equipment that can reach high temperature.



Working Principle

The heat is generated by electricity passing through the heating elements and transferred to the charge through radiation. It usually works by putting a high-temperature heating coil in an insulated material. The insulating material effectively acts as a muffle, preventing heat from escaping. Horizontal Muffle Furnaces use open coil heating elements on both sides of the heating chamber to allow fast heating with minimal temperature gradient. This energy efficiency is enhanced through the use of high thermal- efficient ceramic insulation surrounding the chamber. The free- floating, ceramic fiber door includes a chamber plug that prevents heat loss around the door by totally sealing when the spring-loaded door is closed. These ovens have a door safety switch which cuts power to the elements if the door is opened during use.

Vertical tube furnaces are characterized by their vertically oriented heating chamber or tube. Inside the tube, the sample or material to be heated is placed and subjected to the desired temperature. These furnaces feature a heating element surrounding the tube, facilitating efficient heat transfer and ensuring uniform temperature distribution along the sample's length.



Advantages

- Gradual increase and decrease in the temperature
- Less labour work
- Uniform distribution of heat
- Regulation of temperature
- Temperature indicator
- Environmental friendly

Disadvantages

- Long time required (12-24 hours)
- Muffle furnaces are quite costly to run due to electrical costs
- Loss of volatile minerals at high temperatures, e.g., Pb, Hg,Ni, Zn.
- Consumes more electricity and not suitable in the areas prone to power cuts

Utility

- Horizontal Muffle Furnaces are used in preparation of bhasmas
- Vertical Muffle Furnaces are used in the preparation of kupipakwa rasayanas

Heating Material

Heating material used in the Ayurveda pharmaceutics depends upon the type of heat required for the paka of the drug. Various drugs need different mode of heat treatment and intensity of heat based on the nature of the drug. Heating materials also varies based on the type of preparation like Kupi pakwa rasayanas, bhasmas etc.,

To achieve the desirable medicinal products, quantity of heat as well as mode of heating plays a vital role, which solely relies on the heating material

Solid

Kashtha

Kashtha, the dried wood of the tree is the common heating material used in the paka of various dravyas. It serves as major form of fuel in Chullika, Kupi pakwa Bhatti and others. Khadira kashtha is chiefly preferred and mentioned the same in different contexts like Nirvapa procedure of Ayaskriti etc.,

Coal/ Rock Coal

Coal is used as a fuel in Angara koshti and other heating devices. Coal will provide optimum temperature which is necessary for the extraction of satva and heat can be regulated or intensified by using vankanala or bhastrika

Valuka, Kshara, Lavana

Valuka is used in the heating device as a medium of heating. Some type of preparations like Kupi pakwa rasayanas and some mrudu dravyas like Somala requires uniform temperature for the proper paka of the dravyas. In such cases, Valuka is used as a medium of heat in Valuka yantra, Valuka puta for providing uniform heat and graded heating(mild, medium and strong). Instead of Valuka, even lavana is used as a medium in lavana yantra. Even Kshara or Bhasmas (wooden ash) is also used in place of sand.

Shakrit

Vanopala, prepared with the shakrit of cow is used as important source of fuel for bhasmikarana of many rasa dravyas like Abhraka, Makshika etc., In some putas, dried powder of vanopala called as Gobara churna is used in the marana of mrudu dravyas like Parada. Here, low grade of temperature will be provided for the longer time. Ajashakrit, the faeces of goat is also used as a heating material where minimum heat is required as in the case of Murchchana samskara of Parada to heat the tapta khalva yantra.

Drava

Jala/ steam, Taila

Jala is made to boil and the heat of that jala or the steam from the boiling water is used in the paka of some dravyas. This method is employed in the yantras like Dola yantra, swedani yantra, Kachchapa yantra and others. In place of jala, Swarasa, Kashaya, Taila is also used depending upon the drug used for the paka. Now a day, steam jacketed vessels/Thermal oil are used in pharmacies in large scale production. Steam jacketed vessel is designed for controlling temperature by the use of a cooling or heating jacket round the vessel via which a cooling or heating fluid is circulated. Thermal oils are low-viscosity fluids that are gradually heated or cooled and circulated around a system to regulate process temperatures.

Indirect Heating

Dhanya Rashi

Drug sealed in the vessel is kept inside the dhanya rashi specially Yava dhanya for stipulated period of time. This is one of the example for Kala samskara. Here, drug containing vessel is placed inside the heap without any exposure to external environment.

By this some amount of heat will be produced and trapped inside. This small amount of heat for a period of time helps in the paka of the drug. This method is employed in the preparation of Ayaskriti. Placing in Dhanya rashi also provides favourable conditions for certain chemical reaction like fermentation, so this is employed in the preparation of Asava, Arishta.

Bhugarbha Sthapana

Bhugarbha sthapana is just placing the drug inside the earth and in some conditions, after placing the drug indirect heating is provided from the above by igniting the Vanopalas placed over it. This type of heat is preferred for the drugs which are thermoliable like Parada and drugs which are explosive like Gouripashana.

Discussion

Ayurveda is the science of life and having holistic as well as multi dimensional approach. Our Acharyas have given importance to every aspects and rational scientific thoughts are found even in its pharmaceutical branch. They had explained about construction of pharmacy along with the equipments and heating devices required for the preparation of medicines. Heating is mandatory process in most of the preparations of Rasashastra and Bhaishajya kalpana.

The main hurdle in consumption of metals and minerals is its non-edibility due to its hard consistency. Hence these materials are to be vigorously processed to make it physically soft, edible and assimilable. Apart from this, Rasadravyas are also processed to make it harmless to the body, in other words, to make it free from toxicity in therapeutic doses. Proper quantum of heat need to be provided to convert the raw metals and minerals into easily absorbable, palatable and quick acting therapeutic form. Regarding with this, various heating devices are explained along with the heating materials and mode of heating. This has been dealt in detail in this chapter.

Puta, Koshti and other heating devices are commonly used in processing and preparations of Rasoushadhis. They indicate quantitative as well as qualitative measure of heating. But the temperature variations are observed in the routine puta system of heating according to the seasons due to variation in humidity, temperature as puta system is an open method where there is every possibility of loss of heat by which it require more energy to meet the loss. For standardization it is necessary to document and reproduce the temperature patterns. This can be achieved with modern equipments like muffle furnace, where the temperature pattern can be maintained according to the needs with precision and with minimal loss of energy as it is a closed system. And also heating material used in those days are not much feasible for present days and for the large scale production. So it is more advantageous if modern technologies and equipments are adopted keeping the ancient principles as a base. For this, it is necessary to have the knowledge of modern heating devices which are also dealt in this chapter.

Conclusion

Heating forms an indispensable process in Ayurveda Pharmaceutics. It is necessary to make the particles of mineral and metals very light and fine, so that its absorption and assimilation are very well possible. Hence the knowledge of these devices of both classical and modern equipments is mandatory to arrive at a product with desired characteristics and therapeutic efficacy.

Extended Learning

- Identify and enlist contemporary devices used in the preparation of Bhasma.
- Review the temperature pattern of various Putas by referring research articles.
- Enlist the specific Puta used for a particular Bhasma Nirmana.
- Interpret the effect of heat transformation in the material subjected to heating through Musha.
- Recall Pakaj Utpatti Siddhant and interpret it for Agni Sannikarsha Sanskara.
- Current trends in heat transfer device e.g. steam jacketed heating device, programmed muffle furnace, programmed furnace for Parpati / Pottali preparation.
- Assess and interpret the effect of fuel in quantum of heat given (time and temperature).
- Analyse and appraise use of proper heating device and fuels used for Ayurvediya Aushadhi Nirmana.

MODEL QUESTIONS

Short Answers

- Define Puta and Briefly describethe importance and types of Puta.
- Explain the Gajaputa and Mahaputa.
- Define Musha and write its importance and application.
- Discuss the practical utility of Mudra and Sandhi Bandhana.
- Write the applications of Chullika and Satwapatana Koshthi
- Write the applications of various heating appliances viz. Gas stove, Hot plate, Heating mantle, Induction Stove, Hot Air Oven.
- Explain the Concept, definition and types of Puta
- Explain the importance of Suryaputa and Chandraputa.
- Explain the Gomayaputa and Kapotaputa
- State importance of Puta and Principle involved in designing different putas.
- Briefly describe the design and applications of Valukaputa
- Discuss the design and applications of Electric muffle furnace and its types
- Describe the applications of thermocouple and pyrometer in Ayurveda pharmaceutics.
- Briefly describe the ingredients and application of Samanya Musha.
- Briefly describe the different types of crucibles e.g. Silica crucible, platinum crucible and write their application.
- Write a short note on Satwapatana Bhashtri.
- Similarities & difference between puta & Electric muffle furnace.
- Write a brief note on Heating Material explained in Rasa classics.
- Explain Induction Stove with its principle and application

CHAPTER 6

KALPANA NIRMANA – I
(PRIMARY & SECONDARY DOSAGE FORMS)

PAPER 1

Contents

Definition, classification with suitable examples, reference, ingredients, quantity, method of preparation, principle involved, instruments used in small and large scale production, siddhi lakshana, shelf life, modern aspect of related preparation of the following

Panchavidha Kashya Kalpana (Primary dosage forms): Swarasa, Kalka, Kwatha, Hima, Phanta

Upakalpana (Secondary dosage forms):

Kalka: Churna Kalpana

Kwatha: Pramathya Kalpana, Paniya Kalpana, Ushnodaka,

Ksheera Paka Kalpana, Laksha Rasa, Mamsa Rasa

Hima Kalpana: Mantha Kalpana, Udaka Kalpana, Panaka Kalpana

Phanta Kalpana: Arka

Learning Outcome

At the end of this chapter, Students can able to

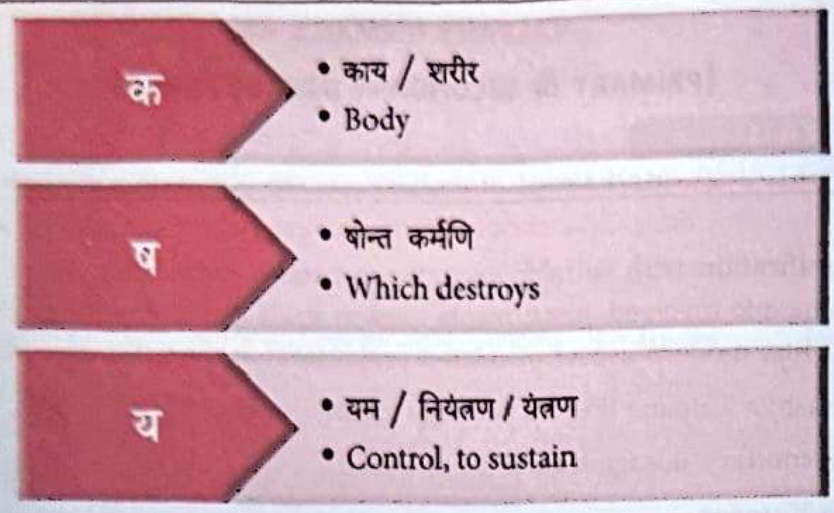
1. Explain Kashaya kalpana and Enlist the dosage form come under Panchavidha Kashaya Kalpana and their Upakalpana.
2. Define with synonyms and classify different varieties of the dosage form in Ayurvediya Aushadhi nirmana
3. Describe method of preparation of dosage form along with the principle involved.
4. Describe meaning of the term Upakalpana. Enlist panchavidha kashaya kalpana and their respective Upakalpana.
5. Explain various kalpas belonging to Various dosage forms -Ingredients, proportion, matra, Anupana, therapeutic uses

Introduction

Pancavidha Kashaya Kalpanas are the fundamental preparations described in Ayurveda pharmaceutics. All other medicinal preparations are the product of further processing of these Kashaya Kalpanas.

Aushada kalpana can be classified into two- primary kalpanas and secondary kalpanas. Primary kalpanas ie **Pancha Vidha Kashaya Kalpanas** are considered to be fundamental preparation which are having good therapeutic action and prepared for instant use. They are the base for many different dosage forms.

The word kashaya has 3 letters:



"के शरीरे स्थति यन्त्रणं इति कषाय:" (Kha. Sam.Khi. St)

Kashaya is a preparation which sustains the body by removing or correcting the vitiated doshas.

कल्प्यते विधीयते असौ विधि:। (S.K.D)

प्रकल्पनं संस्करणम् इति। (Chakrapani)

कल्पनं योजनमित्यर्थ:। (Arunadatta)

शरीरे प्रयोगार्थम् पेषण तोयाग्न्यादि योगेन। संस्करण मानेन इति कल्पना।। (Chakrapani)

The word kalpana means method/process or transformation/conversion/ modification procedures/preparation of medicines by using either a single drug or a combination of several drugs by grinding, pouding, heating, frying, boiling etc carried out to make the drug fit for internal administration and to fulfil the patient's compliance.

KALPANA means the ideology of making use of different dravyas. It is the process or modification through which a substance is transformed into medicinal form. The raw products obtained from animal, plant or mineral source is to be converted into that form, by which it would be therapeutically fit for use.

So Pancha vidha kashaya kalpana are the five types of preparations which corrects the vitiated doshas and sustains the healthy body.

Pancha Vidha Kashaya Kalpana

1. Swarasa
2. Kalka
3. Kashaya
4. Hima
5. Phanta

अथात: स्वरस: कल्क: क्वाथश्च हिम फाण्टकौ। ज्ञेया: कषाया: पञ्चैते लघव: स्यु: यथोत्तरम्।।

(Sha.Sam.Ma. Kha.1/1)

Swarasa, Kalka, Kwatha, Hima and Phanta are the basic forms of preparation. These five kalpana are laghu (lighter) in an descending order, which means the swarasa is the most guru (heaviest) among all of them and phanta being the most laghu (lightest).

रसः कल्कः शृतः शीतः फाण्टश्चेति प्रकल्पना। पञ्चधैव कषायाणां पूर्वं पूर्वं बलाधिका। (A. Hri.Ka. St.6/8)

Acharya Vagbhata says, there is a gradational decrease in the potency from Swarasa to Phanta and their strength goes on decreasing. Swarasa is the most potent preparation and Phanta is the least potent. Therefore, while prescribing these different categories of preparations, One should consider the strength and agni of the patient and seriousness of illness.

तेषां यथापूर्वं बलाधिक्यम्, अतः कषाय कल्पना व्याध्यातुरबलापेक्षिणी, न त्वेवं खलु सर्वाणि सर्वत्रोपयोगिनि भवन्ति।। (Cha.Sam.Su.St. 4/7)

Acharya Charaka says, that Pancha Vidha Kashaya Kalpanas should be used after ascertaining the Bala of the patient and also Vyadhi Avastha and Vyadhi Bala, accordingly kalpanas must be administered. All types of preparations are not preferred to use in all conditions as all types are not equally effective in all conditions and their usage depends on different criteria.

Basic formulations as mentioned in various texts

S.No.	Cha.Sam	Su.Sam	A.Sam	A.Hri	Kha. Sam	Sha. Sam	A.P
1	Swarasa	Ksheera	Niryasa	Rasa	Churna	Swarasa	Kalka
2	Kalka	Swarasa	Kalka	Kalka	Sheeta	Kalka	Churna
3	Shruta	Kalka	Niryuha	Shruta	Swarasa	Kwatha	Rasa
4	Sheeta	Shruta	Sheeta	Sheeta	Abhishava	Sheeta	Taila
5	Phanta	Sheeta	Phanta	Phanta	Phanta	Phanta	Arka
6		Phanta			Kalka		
7					Kwatha		

Kashaya Yoni

पञ्च कषाययोनय इति मधुरकषायोऽम्लकषायः कटुकषायस्तिक्तकषायः कषायकषायश्चेति तन्त्रे संज्ञा।।

(Cha.sam.Su.St.4/7)

पञ्च रसः लवण वर्जिताः। (A. Hri Ka. St. 6)

SOURCE (YONI)	KASHAYA KALPANA
Madhura Rasa	Madhura Kashaya
Amla Rasa	Amla Kashaya
Katu Rasa	Katu Kashaya
Tikta Rasa	Tikta Kashaya
Kashaya Rasa	Kashaya Kashaya

As per Charaka samhita, the name Kashaya pertains to 5 kashaya rasas (except lavana rasa among shadrasas) of the drugs from which the kashaya kalpanas are

CHAPTER SIX

prepared. Lavana rasa is excluded from this, because independent preparation cannot be made from lavana rasa. Lavana rasa is in the form of a dry substance and does not have any kashta yoni (Herbal source). It dissolves when the water is added to it. It does not contain any volatile principles and also cannot be heated to make any new preparation. Other five rasas have many sources, that is of herbal origin. So fundamental preparations are only five in number.

Kashaya Kalpana and Panchamahabhoota

The consideration of the type of Kashaya kalpana depends on the panchamahabhoota constitution of the drug. for example, Manduka parni is used in Swarasa form and Sankha Pushpi in Kalka form as they are having the predominance of Jala and prithvi mahabhoota respectively. Likewise drugs with Agni mahabhoota predominance are taken for Kwatha preparation and those having Vayu and Akasha mahabhoota predominanace are to be considered for Hima or Phanta kalpana.

Pancha Mahabhoota	Kashaya Kalpana
Pruthvi	Kalka
Jala	Swarasa
Agni	Kwatha
Akasha, Vayu	Hima, Phanta

Upakalpana

These are the preparation prepared by adopting main principles of Pancha vidha kashaya kalpana. These are categorised based on the resemblance in the method of preparation of Pancha vidha kashaya kalpana. Swarasa is not having any upakalpana. Upakalpanas of other preparations are :

Kalka	Kwatha	Hima	Phanta
Churna	Pramathya	Mantha	Arka
	Paniya	Udaka	
	Ushnodaka	Panaka	
	Ksheerapaka		
	Laksha rasa		
	Mamsa rasa		

Principle

The basic principle behind preparation of these Kashaya kalpana is that every substance in the Universe have a potential to become a drug. But not all the substance as a whole or any part of the substance may be useful for the expected therapeutic action

in the specific diseased state. Only some of the plant ingredients are therapeutically active. So the therapeutically useful part of the substance needs to be separated out and put to therapeutic use. The therapeutically useful part is termed as 'Saara Bhaaga'. This extraction of Saara bhaga can be achieved through specific processing of various preparation known as Pancha vidha kashaya kalpana. Different extraction methods also depends on the pancha mahabhoota composition of the substances.

Many a times the substance may contain more than one therapeutically useful constituent. Different procedures may be required to separate out such useful constituent. The components soluble in water are extracted in water where as solvents like fat, oil or alcohol are required to extract ingredients soluble in those solvents. Sometimes a combined solvent system need to be used. So keeping the pancha vidha kashaya kalpana as a base, many other formulations are designed which are termed as Upakalpanas and Secondary preparations. Depending on the requirement, different procedures are adopted to extract therapeutically useful ingredients. Water being universal solvent is used for majority of extractions. Since the plant material used for drug preparation is very similar to food material the cooking practices such as heating, boiling, frying etc. are used in pharmaceutical procedures as well.

Fresh as well as dried plant material is used for processing- depending on availability and necessity. Different procedures are adopted to prepare a dosage form, which is easy for administration, palatable and having longer shelf life. Thus the type of pharmaceutical processing depends on following factors:

- Nature of the raw material: fresh or dry
- Required concentration of the dosage form
- Solubility of therapeutically useful component of the plant
- Heat stability of therapeutically useful component of the plant
- Route of administration
- Shelf life of prepared dosage form

Swarasa

Swarasa is the fresh juice extracted from the drug. Among the Pancha vidha kashaya kalpana, Swarasa is the most potent preparation but is heavy (Guru) for digestion.

Defnition

स्वरस: इति सध्योरस:। (Sha.Ka.Dr.)

The freshly extracted juice of a plant is called Swarasa.

यन्त्र निष्पीडितात् द्रव्यात् रस: स्वरस उच्यते। (Cha.Sam. Su St.4/7)

Swarasa is the juice extracted from the drug by exerting mechanical pressure with any instrument.

Different Method of Preparation of Swarasa

1) **For fresh and wet drugs**

अहतात् तद्गुणाक्रान्तात् द्रव्यात् क्षुण्णात् समुद्धरेत्। वस्त्रनिष्पीडितो यः स रसः स्वरस उच्यते।।

(Sha.Sam. Ma. Kha.1/2)

The Plant drug which is not infested by any of the factors like cold, fire, worm etc, has to be freshly collected and pounded. Then the pounded drug has to be strained through a cloth to extract the juice of the drug. This juice (Rasa) is called Swarasa.

2) **For dry and soft drugs**

कुडवं चूर्णितं द्रव्यं क्षिप्तं च द्विगुणे जले। अहो रात्रं स्थितं तस्माद् भवेद् वा स उत्तमः।। (Sha.Sam. Ma. Kha.1/3)

If the drugs are dry and soft in nature, 1 kudava (4 pala= approx. 192 gms) i.e., 1 part of the drug has to be pounded to coarse powder and twice the amount of water is added to it. Then drug has to be kept soaked in water for 24 hours. Later the contents are squeezed, filtered and juice is collected which is considered to be the best.

3) **For dry and very hard drugs**

आदाय शुष्कं द्रव्यं वा स्वरसानाम् असम्भवे। जले अष्ट गुणिते साध्यं पादशिष्टं च गृह्यते।।

(Sha.Sam. Ma. Kha.¼)

If the drugs are very hard and dry, it is impossible to extract swarasa from it. In such case, 1 part of the drug has to be pounded into coarse powder and 8 parts of water is added to it, the contents are boiled till it reduced to ¼. Later it is filtered and swarasa can be collected.

4) **For fibrous drugs**

पुटपाकस्य कल्कस्य स्वरसो गृह्यते यतः। अतस्तु पुटपाकानां युक्तिरत्रोच्यते मया।।
पुटपाकस्य मात्रेयं लेपस्याङ्गार वर्णता। लेपं च द्व्यङ्गुलं स्थूलं कुर्याद् वा अङ्गुष्ठमात्रकं।
काश्मरी वट जम्ब्वादि पत्रैः वेष्टनमुत्तमम्।। पलमात्रं रसो ग्राह्यः कर्षमात्रं मधु क्षिपेत्।
कल्क चूर्ण द्रवाद्यास्तु देयाः स्वरसवद् बुधैः।। (Sha.Sam. Ma. Kha.1/25-28)

It is very difficult to extract the juice even in some fresh drugs when the leaves are more fibrous in nature. In such case, swarasa can be extracted by putapaka method. Kalka (paste) has to be prepared with the herbal drugs to be used. Then the kalka has to be wrapped in a leaf kashmari, vata, Jambu etc. and tied the mass with a thread. Over this, mud should be smeared uniformly for about 1 Angula thickness. Then it should be dried and heated using vanopalas it becomes red hot. Later it must be taken out from fire and allowed for self cooling. The outer mud layer, leaves etc. should be removed. Then the kalka is squeezed with a clean cloth and juice is extracted. The juice extracted is called putapaka swarasa. This is administered in the dose of 1 pala along with 1 karsha of Madhu. If the kalka, churna, drava or other prakshepaka dravya has to be administered along with this swarasa, then the dose will be similar to that of the general Swarasa.

CHAPTER SIX

Siddhi Lakshana

Swarasa should have similar qualities of varna (color), rasa (taste) and gandha (odour) of the drug with which it is extracted.

Principle Involved

Swarasa is a type of pharmaceutical preparation adopted to extract all the water soluble active principle from the drug. Drugs with the predominance of Jala mahabhoota are usually preferred as the maximum constituents can be expressed out in the form of juice. Different methods of swarasa preparation has been told for the maximum extraction of alkaloids or active principles in various forms of drugs like wet, dry, soft and hard. As the fibres, cellulose and other bulks of the drug are removed, this preparation becomes more concentrated with active principles. Hence it is Guru for digestion and to be used in Balawan Rogi as well as Balawan Roga. Swarasa prepared by soaking or providing heat becomes comparatively laghu for digestion and therefore the dose of Nishoshita and agni siddha swarasa is more than niragni siddha swarasa.

The basic idea behind the putapaka process is that the cellular structure of the plants like neem, jambu, vasa etc. are morphologically arranged in such a way that they may not allow losing their contents by normal squeezing process. By subjecting them to heating process, cellular structure becomes soft and juice can be extracted. The steaming process in swedani yantra or pressure cooker will also help in extraction of swarasa in such type of drugs.

As Swarasa is a pure herbal extract, it contains chemical constituents in natural form. There is a least chance of alteration of chemical properties of Swarasa because very less physical process is involved in its preparation. That may be the reason for the highest pharmaceutical and therapeutic potency of Swarasa.

Dose

स्वरसस्य गुरुत्वात् च पलमर्धं प्रयोजयेत्। निशोषितं चाग्नि सिद्धं पलमात्रं रसं पिबेत्।। (Sha.Sam. Ma. Kha. 1/5)

Due to its guru property, Anagni siddha swarasa dose is ½ pala (24 ml)

Nishoshita (soaked over night) and Agni siddha swarasa dose is 1 pala (48 ml)

Prakshepaka Dravyas

मधु, श्वेता, गुड, क्षार जीरक लवणं तथा। घृतं तैलं च चूर्णादीन् कोल मात्रं रसे क्षिपेत्।।

(Sha.Sam.Ma.Kha. 1/6)

To improve the palatability and action of the drug, Prakshepaka dravyas are added at the time of administration. Prakshepaka dravyas advised for the swarasa are Madhu, Sita, Guda, Kshara, Jeeraka, Lavana, Ghrita, Taila and churnas with the dose of 1 kola (6 gms)

Shelf life: Instant use

General Uses of Swarasa

- Swarasa is the most potent preparation. It is administered orally as a effective dosage form by ascertaining the agni of the patient.
- It is also used externally in some conditions for dhara, prakshalana and other purpose.
- It serves as an important constituent in the formulation of secondary preparations like Asava, Sharkara, Avaleha, Ghrita, Taila etc.,
- It is used as an Anupana to other preparation like Vati, Churna etc.,
- It is used as bhavana dravya in the preparations like Vati
- It is used for the shodhana of visha dravyas, as a media in swedana, bhavana etc.,
- It is also used in marana procedure for giving bhavana and prepare chakrikas.

Examples:-

Tulasi Swarasa

पीतो मरिच चूर्णेन तुलसीपत्रजो रसः।
द्रोणपुष्पीरसो वापि निहन्ति विषमज्वरान्।। (Sha.Sam.Ma.Kha. 1/10)

Ingredients : Tulasi patra

Method of Preparation:
- Leaves of the Tulasi which is not infested by worm or any of the factors has to be freshly collected and pounded.
- Then the pounded Tulasi paste has to be strained through a cloth to extract the juice of the Tulasi.

Anupana : Maricha churna

Indication : Vishama jwara

Ardraka Swarasa

आर्द्रकस्वरसः क्षौद्रयुक्तो वृषणवातनुत्।
श्वासकासारुचीर्हन्ति प्रतिश्यायं व्यपोहति।। (Sha.Sam. Ma. Kha.1/13)

Ingredients : Ardraka khanda

Method of preparation:
- After removing the outer covering of the Ardraka khanda, it is collected and pounded.
- Then the pounded paste is strained through a cloth to extract the juice of the Ardraka.

Anupana : Madhu

Indication : Vrushana vata, Shwasa, Kasa, Aruchi, Pratisyaya

Kumari Swarasa

निशाचूर्णयुतः कन्यारसः प्लीहापचीहरः।। (Sha.Sam. Ma. Kha.1/15)

Ingredients : Kumari patra

Method of preparation: After removing the outer covering of the kumari patra, pulp is collected, pounded and the paste is squeezed to extract swarasa

Anupana : Nisha churna

Indication : Pleeha roga

Vasa Putapaka Swarasa

पिष्टानां वृषपत्राणाम् पुटपाकरसो हिमः। मधुयुक्तो जयेत् रक्तपित्त कास ज्वर क्षयान्।
(Sha.Sam.Ma.Kha. 1/38)

वासकस्वरसः पेयो मधुना रक्तपित्तजित् । ज्वरकासक्षयहरः कामलाश्लेष्मपित्तहा।। (Sha.Sam.Ma.Kha. 1/8)

Ingredients : Vasa patra

Equipment : Patra, Sutra, mrit, vanopalas, Vastra

Method of preparation:

- Leaves of the Vasa has to be pounded to prepare its kalka.
- Then the kalka has to be wrapped in a leaf and tied the mass with a thread.
- Over this, mud should be smeared uniformly for about 1 Angula thickness.
- Then it should be dried and heated over burning charcoal until it becomes red hot.
- Later it must be taken out from fire and allowed for self cooling.
- The outer mud layer, leaves etc. should be removed and the kalka is squeezed with a clean cloth and Vasa putapaka swarasa is extracted.

Anupana : Madhu

Indication : Raktapitta, Jwara, Kasa, Kshaya, Kamala, Kapha-Pitta roga

Modern Aspect

Swarasa is the expressed juice, where the activity of mashing or pounding of the medicinal plant for the release of the juice from the plant cells is similar to the modern extraction technique of mechanical pounding/mashing. This indicates that membrane

rupturing is predominant in swarasa method which includes membrane rupturing and solute diffusion principles. The extraction steps may be performed using homogenizer/ mechanical grinder as this dosage form uses physical methods for breakdown of cell wall. Then the action of filtering the solvent to separate it from the unwanted plant components also indicates that it is similar to the modern extraction technique and filtration.

Kalka

Introduction

Kalka Kalpana is a primary preparation which is lighter for digestion than swarasa, while heavier for digestion than rest other primary preparation. Drugs having the predominance of pruthvi mahabhoota are preferred to make into kalka form.

Definition

यः पिण्डो रस पिष्टानां स कल्कनाः परिकीर्तितः। (Cha.Sam.Su.St 4/7)

Kalka is a soft mass of paste with the rasa (juice) of the drug prepared by pounding the drug.

द्रव्यमार्द्रं शिलापिष्टं शुष्कं वा सजलं भवेत्। प्रक्षेपावापकल्कास्ते तन्मानं कर्षसम्मितम्।।

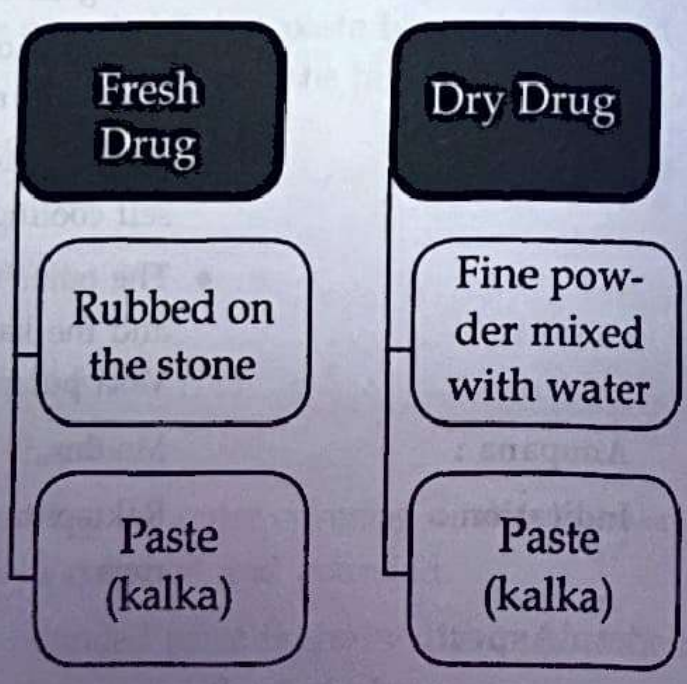
(Sha.Sam.Ma.Kha. 5/1)

Kalka is a soft paste form prepared by grinding the fresh drug on the stone and dry drug by adding sufficient quantity of water to the fine powder of the drug to make it into paste form.

Synonyms prakshepa and Avapa.

Method of Preparation

- When a drug is fresh, it should be rubbed on a stone to make it into fine paste form.
- When a drug is dry, the fine powder of the drug is rubbed with a little or required quantity of water and convert it to the form of paste. This paste is called as Kalka.



Siddhi Lakshana

- Kalka should be soft, fine and free from fibres
- It sould have same varna, rasa and gandha of the drug with which it is prepared.
- When pressed on kalka, One can appreciate finger print marks over it

Principle Involved

Kalka is the only preparation where the whole drug is converted into therapeutic dosage form. The principle behind its formulation is to use whole constituents of the drug without leaving anything as wastage. Drugs having the predominance of Pruthvi mahabhoota are suitable for this type of preparation.

Kalka kalpana is laghu in guna when compared to swarasa as the fibre content is also present. Its potency is also inferior than swarasa because it also contains inert bulk fibre and cellulose.

Prakshepaka Dravyas and their Quantity

कल्के मधु घृतं तैलं देयं द्विगुणमात्रया। सितागुडं समौ दद्याद् द्रवा देयाश्चतुर्गुणाः।। (Sha.Sam. Ma. Kha.5/2)

Prakshepaka dravyas	Quantity
Madhu, Ghrita, Taila	Double
Sita, Guda	Equal
Drava	4 times

Dose

..... तन्मात्रा कर्षमम्मिताः।।

Dose of the kalka is 1 karsha (12 gms)

Shelf life : Instant use

General Uses of Kalka

- Kalka is one of the most potent preparation which can be administered orally in vaious disease condition.
- It is also used externally as lepa in Vrana, Ruja, daha and other conditions.
- It is also used in netra kriya kalpa (Pindi, Bidalaka), Gandusha, Basti
- It is used as an Anupana along with other solid or liquid preparation.
- It serves as an important constituent in the formulation of secondary preparations like Ghrita, Taila, Vati etc.,
- It is used for the parada samskara and processing for other Rasa dravyas.

Examples:-

Nimba Kalka

लेपान्निम्बदलैः कल्को व्रणशोधनरोपणः।। भक्षणाच्छर्दिकुष्ठानि पित्तश्लेष्मकृमीञ्जयेत्।

(Sha.Sam. Ma. Kha.5/5-6)

Ingredients : Nimba patra

Method of preparation: Fresh leaves of Nimba are taken and rubbed in the Khalva yantra to make it into fine paste form

Action : External application- Vrana shodhana and ropana

Internal : Chardihara, Kushtaghna, Pitta kaphahara, Krimighna

Rasona Kalka

शुद्धः कल्को रसोनस्य तिलतैलेन मिश्रितः। वातरोगाञ्जयेत् तीव्रान् विषमज्वरनाशनः।।

(Sha.Sam.Ma.Kha. 5/7)

Ingredients : Dehusked lashuna bulbs

Method of preparation:
- Lashuna bulbs are dehusked and rubbed in the Khalva yantra to make it into fine paste form

Anupana : Tila taila

Indication : Vata roga, Severe vishama jwara

Note : Kalka should be used immediately. It cannot be stored for a longer duration. Hence for convenience and to enhance the shelf life its Upakalpanas are formulated. According to Vagbhata, Churna and Vati Kalpana are the Upakalpana of Kalka Kalpana. But Sharangadhara considers only churna as upakalpana of kalka kalpana

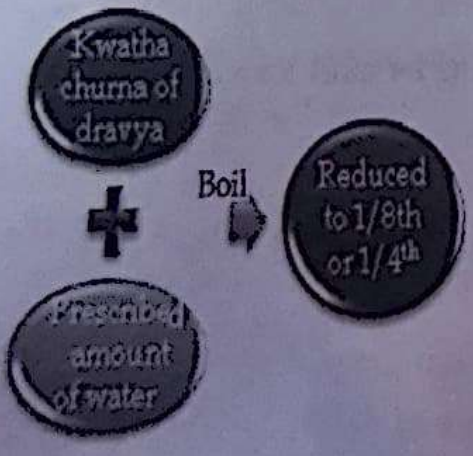
CHAPTER SIX

Modern Aspect

Kalka is the paste, where the Preparation involves the technique of Mechanical pounding/mashing where "membrane rupturing" principle is involved. Pounding/ mashing causes mechanical shear and stress on the cells, which can cause disruption of cell membrane and releases cellular components outside the membrane. This procedure can be performed using homogenizer/mechanical grinder as this dosage form uses physical methods for breakdown of cell wall. Here, large particles are converted into fine particles.

Kwatha

Definition



वन्हौ तु क्वाथितम् द्रव्यं शृतमाहुश्चिकित्सकाः।

(Cha.Sam.Su.St. 4/6)

Kwatha or the Shruta is the preparation obtained by boiling drugs with water over agni.

Synonyms

शृतः क्वाथः कषायश्च निर्यूहः स निगद्यते।

(Sha.Sam.Ma.Kha. 2/2)

Synonyms of Kwatha are Shruta, Kashaya and Niryuha

Method of Preparation

पानीयं षोडशगुणं क्षुण्णे द्रव्यपले क्षिपेत्।
मृत्पात्रे क्वाथयेद् ग्राह्यमष्टमांशावशेषितम्।।
तज्जलं पाययेद्धीमान् कोष्णं मृद्वग्निसाधितम्। (Sha.Sam.Ma.Kha. 2/1-2)

Kwatha is prepared by boiling 1 pala (48 gms) of coarsely powdered dravya with 16 parts of water in an earthen vessel over the mild fire and reduced to $\frac{1}{8}^{th}$ part. Later it is filtered and used when it is still warm in the person having mrudu agni.

तत्रान्यतम् परिमाण सम्मितानां यथायोगं त्वक् पत्रं फल मूलादीनामातप परिशोषितानां छेद्यानि खण्डशः छेदयित्वा, भेद्यान्य-शुशो भेदयित्वा, अवकुट्य, अष्टगुणेनषोडशगुणेनवाऽम्भसाऽभिषिच्य, स्थाल्यांचतुर्भागावशिष्टंक्वाथयित्वाऽवहरेदित्येष-क्वाथकल्पः, अथवातत्रोदकद्विद्रोणेत्वक्पत्रफलमूलादीनांतुलामावाप्यचतुर्भागावशिष्टंनिष्क्वाथ्यावहरेदित्येषकषायकल्पः। (Su.Sam.Chi.St. 31/8)

According to Sushrutha, any part of the drug among twak, patra, phala, moola etc., which is therapeutically useful should be collected and dried well. This is made into coarse powder, 8/16 parts of water has to be added and boiled to prepare Kashaya. When the content reduced to $\frac{1}{4}^{th}$, it is taken off the agni and filtered.

Vagbhata also explains the preparation of Kwatha as boiling one part of drug in 8 parts of water and reducing it to $\frac{1}{4}^{th}$.

अपिधानमुखे पात्रे जलं दुर्जरतां व्रजेत्। तस्माद् आवरणं त्यक्त्वा क्वाथादींश्च विपाचयेत्।।
(Sha.Sam. Ma. Kha. 2/7)

While preparing Kwatha, vessel should not be covered with a lid. If it is covered with a lid, it will become guru and heavy for the digestion.

Types of Kwatha

पाचनो दीपनश्च शोधनः शमनस्तथा। तर्पणः क्लेदनः शोषी क्वाथः सप्तविधो स्मृतः।।
पाचनः शोधनीयश्च पादशेषः प्रशस्यते।। (Kha.Sam)

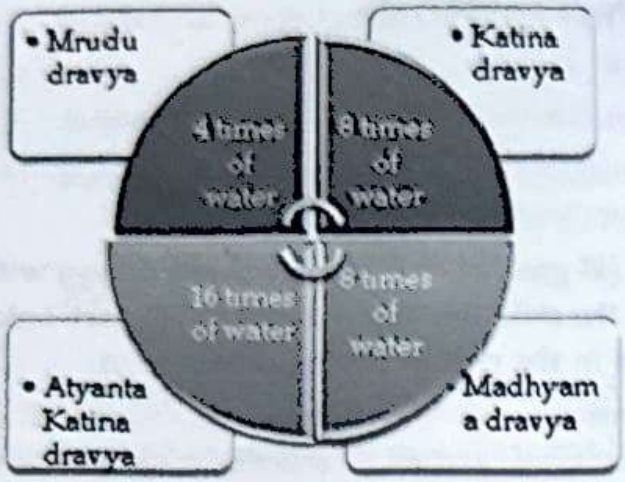
According to Kashyapa samhita, Kwatha is of 7 types:

1. Pachana
2. Deepana
3. Shodhana
4. Shamana
5. Tarpana
6. Kledana
7. Shoshi

Among these 7 types, Pachana and Shodhana kashayas are to be prepared by reducing the water to $\frac{1}{4}^{th}$ and other types are to be prepared by reducing to $\frac{1}{8}^{th}$.

In the Sneha kalpana adhyaya, while explaining the preparation of Kwatha, Acharya Sharangadhara mentions different propotion of water based on the hardness and quantity of dravyas-

चतुर्गुणं मृदुद्रव्ये कठिनेऽष्टगुणं जलम्।



तथा च मध्यमे द्रव्ये दद्यादष्टगुणं पयः।।
अत्यन्तकठिने द्रव्ये नीरं षोडशिकं मतम्।
(Sha.Sam.Ma.Kha. 9/3-4)

If the drugs are mrudu, 4 parts of water should be taken, if the drugs are Madhyama or Katina, then 8 parts of water and for atyanta Katina drugs 16 parts of water to be added and boiled to prepare Kashaya

कर्षादितः पलं यावत् क्षिपेत् षोडशिकं जलम्।।४।।
तदूर्ध्वं कुडवं यावद् भवेदष्टगुणं पयः। प्रस्थादितः क्षिपेन्नीरं खारी यावच्चतुर्गुणम्।।५।।

(Sha.Sam. Ma. Kha. 9/4-5)

If the quantity of dravyas varies from 1 karsha (12 gms) to 1 pala (48 gms), water should be 16 times of the dravya; if dravya of 1 Pala (48 gms) to 1 Kudava (192 gms) is taken, water should be 8 times; if dravya is 1 Prashta (768 gms) to 1 Khari (196 kg 608 gms), then quantity of water should be 4 times of the dravya.

Quantity of Dravya	Propotion of water
1 Karsha- 1 Pala	16 times
1 Pala – 1 Kudava	8 times
1 Prashta – 1 Khari	4 times

Siddhi Lakshana

Kwatha should have similar qualities of varna (color), rasa (taste) and gandha (odour) of the drug with which it is prepared. It should be devoid of qualities like Ghana, Picchila, kunapa or visra gandha.

Principle Involved

The Kwatha procedure is the decoction process which is adopted to extract the water soluble and thermostable principle from the hard raw herbal drugs. It needs to be boiled till it reduced to ⅛th or ¼th. This is to extract the required amount of active principle to be extracted into the water which is used as menstrum. Different proportion of water has been told to use in the drugs having various consistency like soft, medium and hard. This aims in complete extraction of the active principles from all types of crude drugs as the soft drugs needs to be boiled for lesser time and hard drugs for longer time to leave its constituents into the menstrum. The solvent used for extraction purposes is called as Menstrum.

The word Mandagni is commonly used in Kwatha preparation. It emphasizes that low temperature extraction can be best extraction process. The time duration is also important for yielding specific active principles from plant sources. Similar observations regarding temperature were observed in a research where the aqueous solutions or ethanol or acetone (30%), extraction temperature of 60°C and extraction time of 30 min were the most efficient for the extraction of polyphenols from dry sage leaves.

The Kashaya kalpana is water soluble extract of the raw drugs and due to agnipaka they are much lighter than Swarasa and Kalka kalpana. Covering the vessel while preparing a kwatha is not advised because if covered, its guna will change to guru from laghu. Drugs with the predominance of Agni mahabhoota are preferred to adopt this procedure. The powder of dravya should be coarse. Fine powder is not recommended as it sediments at the bottom and active principles are not properly extracted, also it seeps into the Kashaya while filtering.

Dose

आहाररसपाके च सञ्जाते द्विपलोन्मितम्। वृद्धवैद्योपदेशेन पिबेत् क्वाथं सुपाचितम्।।

(Sha.Sam. Ma. Kha. 2/3)

As per the advice of senior physicians, Kwatha is to be administered after the digestion of food in the dose of 2 palas (96 ml) for the proper digestion of the Kwatha.

क्वाथस्य मध्यमा मात्रा पलानां प्रकीर्तिता । (Sha.Sam.Ma. Kha. 2/3 teeka)

The madhyama matra of Kwatha is 1 pala (48 ml)

Prakshepaka Dravyas and their Quantity

क्वाथे क्षिपेत् सितामंशैश्चतुर्थाष्टमषोडशैः। वातपित्तकफातङ्के विपरीतं मधु स्मृतम्।। (Sha.Sam.Ma.Kha. 2/4)

	Sita	Madhu
Vataja roga	¼th part	1/16th part
Pittaja roga	⅛th part	⅛th part
Kaphaja roga	1/16th part	¼th part

जीरकं गुग्गुलं क्षारं लवणं च शिलाजतु। हिङ्गु त्रिकटुकं चैव क्वाथे शाणोन्मितं क्षिपेत्।।

(Sha.Sam. Ma. Kha.2/5)

Jeeraka, Guggulu, Kshara, Lavana, Shilajatu, Hingu, Trikatu are used along with kwatha at the dose of 1 shana (3 gms) each.

क्षीरं घृतं गुडं तैलं मूत्रं चान्यद् द्रवं तथा। कल्कं चूर्णादिकं क्वाथे निक्षिपेत् कर्षसम्मितम्।।

(Sha.Sam.Ma.Kha. 2/6)

Ksheera, Ghrita, Guda, Taila, any dravas, Kalka, churnas are added to the kwatha as Prakshepaka dravyas at the dose of 1 karsha (12 gms) each.

Shelf Life: Instant use

It is better not to reheat kashaya.

Time of Administration

The time of administration is usually 1 hour before food but can be altered according to the roga and rogi assessment by the Vaidya.

General Uses of Kwatha

- It is a laghu kalpana and can also be given to a madhyama and alpa agnibala person except some of the kashaya with guru dravya as main ingredients like vidarayadi, prasaranyadi kashaya etc.
- It is used externally in some conditions for dhara, prakshalana and other purpose.
- It serves as an important constituent in the formulation of secondary preparations like Asava, Sharkara, Avaleha, Ghrita, Taila etc.,
- It is also used in Basti kalpas.
- It is used as an Anupana to other preparation like Vati, Churna etc.,
- It is used as bhavana dravya in the preparations like Vati
- It is used for the shodhana of Rasadravyas, as a media in Nirvapa, bhavana etc.,

Examples:

Punarnavastaka Kwatha

पुनर्नवाभयानिम्बदार्वीतिक्तापटोलकैः ।। गुडूचीनागरयुतैः क्वाथोगोमूत्रसंयुतः।
पाण्डुकासोदरश्वासशूलसर्वाङ्गशोथहा।। (Sha.Sam.Ma. Kha.2/78-79)

Ingredients

S.No.	Ingredient	Part used	Quantity
1	Punarnava	Root	1 Part
2	Abhaya (Haritaki)	Fruit Pulp	1 Part
3	Nimba	Stem bark	1 Part
4	Darvi (Daruharidra)	Heart Wood	1 Part
5	Tikta	Whole Plant	1 Part
6	Patola	Whole Plant	1 Part
7	Guduchi	Stem	1 Part
8	Nagara	Rhizome	1 Part

Method of Preparation

Coarse powder of all the above drugs are taken, 16 parts of water is added and boiled till it reduces to ⅛th. Later it is filtered and used when it is warm.

Anupana: Gomutra

Indication: Pandu roga, Kasa, Udara, Shwasa, Shoola, Sarvanga shotha.

Rasna Sapthaka Kwatha

रास्नागोक्षुरकैरण्डदेवदारुपुनर्नवा। गुडूच्यारग्वधश्चैव क्वाथमेषां विपाचयेत्।।
शुण्ठीचूर्णेन संयुक्तं पिबेज्जङ्घाकटिग्रहे। पार्श्वपृष्ठोरुपीडायामामवाते सुदुस्तरे।। (Sha.Sam.Ma.Kha. 2/88-89)

Ingredients

S.No.	Ingredient	Part used	Quantity
1	Rasna	Root	1 Part
2	Gokshura	Root	1 Part
3	Eranda	Root	1 Part
4	Devadaru	Heart Wood	1 Part
5	Punarnava (Rakta Punarnava)	Root	1 Part
6	Guduchi	Stem	1 Part
7	Aragvadha	Fruit Pericarp	1 Part

Method of Preparation

Coarse powder of all the above drugs are taken, 16 parts of water is added and boiled till it reduces to $\frac{1}{8}^{th}$. Later it is filtered and used when it is warm.

Anupana/Prakshepa Dravya

Shunti churna

Important Therapeutic Uses

Jangha shula, Uru shula, Parshva shula, Trika shula, Prushta shula.

Modification

The kwatha formed after boiling raw drugs is further concentrated in a vacuum concentrator machine until required quality parameters are attained. The resultant material is preserved by adding preservatives like benzoic acid, sodium benzoate etc. Dose of the bottled kashaya is lesser than the classical kalpana as it is more concentrated viz. 30-40 ml a time; the kashayam prepared by some pharmaceuticals may have even lesser dose of 10-15 ml as they are even more concentrated. Modification is done to alter its taste to make it more palatable. Palatability is also important to consider but not at the cost of efficacy.

Modern Aspect

Kwatha can be correlated to the hot solvent extraction. Kwatha extraction method involves extraction using solvent with heat as an enhancer to increase the solubility of compounds in a solvent and to breakdown the cell wall. This phenomenon can also be seen in a hot solvent extraction using normal heating or heating using microwave.

Further, heat indirectly aids in the separation by removing the volatile compounds. Ultrasound-assisted extraction can also be used as the extraction technique along with heat to speed up the cell breakdown.

Filtration utilizes the size-exclusion principle for separating compounds by allowing only particles of a particular size to pass through the filter. In kwatha, the action of filtering the solvent to separate it from the unwanted plant components also indicates that it is similar to the modern extraction technique and filtration, principle as MPP (Modern Processing Principle). In addition, use of heating during extraction step could cause removal of volatile compounds from the solvent as well as prevent the adsorption of the extracted compounds on nonsoluble part of the herb (like cell wall). This shows that volatility of the compounds is done to remove the unwanted volatile principles without the use of any special separation step.

Hima

Definition

शीतो रात्रिं द्रवे स्थितः। (A.Hri.Ka.St. 6/10)

Sheeta kashaya or Hima is prepared by keeping the dravya in the drava for over night.

क्षुण्णं द्रव्यपलं सम्यक् षड्भिर्नीरपलैः प्लुतम्। निशोषितं हिमः स स्यात् तथा शीतकषायकः।।
(Sha.Sam.Ma.Kha. 4/1)

One pala of coarse powdered dravya is to be soaked in 6 times of water for overnight. Next day, the drug is rubbed well and filtered to get the Hima. This is also called as Sheeta kashaya.

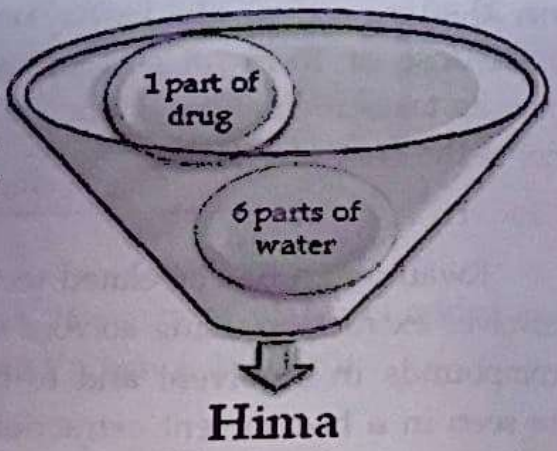
द्रव्यादापोत्थितात्तोये प्रतप्तेनिशि संस्थितात्।। कषायो योऽभिनिर्याति स शीतः समुदाहृतः। (Cha. Sam.Su. St.4/7)

Acharya Charaka has advised to take boiled water instead of cold water. He had mentioned to add boiled water to the dravya, keep it overnight and filter in the morning. This filtrate is called as Sheeta Kashaya.

Synonyms: Sheeta kashaya.

Method of Preparation

One part of dravya in the form of Coarse powder has to be taken in the vessel and 6 parts of water to be added and soaked over night. Next day, soaked and softened drug is rubbed well and filtered through the cloth and used along with suitable anupana.



Principle Involved

Hima is the cold infusion of aromatic or sheeta veerya herbs which are proposed to be used for Pitta disorders. Aromatic herbs may lose their active volatile components by heating or boiling, hence for such drugs, Hima kalpana is adopted, by which active ingredients can be collected in cold infusion form. Water is used as menstrum as it has more penetration power and dissolves the active constituents of the drug.

Hima kalpana is designed to extract the water soluble extracts from the herbal drugs which are heat sensitive and contains volatile principles. The drug will be in contact with the menstrum for the whole night, so the drava dravya contact period will be more resulting in the maximum extraction of active principles by rubbing the soaked and softened dravya. This procedure is suitable for the drugs having Vayu and Akasha mahabhoota predominance.

Dose

तन्मानं फाण्टवज्ज्ञेयं सर्वत्रैवैष निश्चयः। (Sha.Sam.Ma.Kha. 4/2)

The dose of Hima is same as that of Phanta i.e., 2 Pala (96 ml)

Shelf life: Instant use

Prakshepaka Dravyas and Their Quantity

सिता मधु गुडादिस्तुं क्वाथवत् प्रक्षिपेत् भिषक्। (Yadavji)

Sitha, Madhu, Guda and other prakshepaka dravyas are to be used, same as that of Kwatha.

General Uses of Hima

- It is a laghu kalpana and can also be given to alpa agnibala person
- It is also used externally in some conditions for dhara, seka and other purpose.
- It serves as an important constituent in the formulation of secondary preparations like Sharkara, etc.,
- It is used as an Anupana to other preparation like Vati, Churna etc.,

Examples:

Dhanyaka Hima

प्रातः सशर्करः पेयो हिमो धान्यकसम्भवः।। अन्तर्दाहं तथा तृष्णां जयेत् स्रोतोविशोधनः।

(Sha.Sam. Ma. Kha.4/7)

Ingredients

S.No.	Ingredient	Part used	Quantity
1	Dhanyaka	Seed	1 Part
2	water		6 Parts

Method of Preparation

One part of Dhanyaka made into Coarse powder has to be taken in the vessel and 6 parts of water to be added and soaked over night. Next day, soaked and softened drug is rubbed well and filtered through the cloth and used.

Anupana: Sharkara

Indication: Antardaha, Trishna, Shroto shodhana

Sarivadi Hima (S.Y.S, Kusthadhikara 21/5th Preparation)

Ingredients

S.No.	Ingredient	Quantity
1	Sariva	1 Part
2	Ushabha (Smilax armata)	1 Part
3	Chopachini	1 Part
4	Manjistha	1 Part
5	Guduchi	1 Part
6	Duralabha	1 Part
7	Rakta chandana	1 Part
8	Gulavanaphsa (Viola odoreta)	1 Part
9	Ushira	1 Part
10	Mundi	1 Part
11	Shahatara (Fumeria indica)	1 Part
12	Kamala pushpa	1 Part
13	Gulabapushpa	1 Part
14	Dronapushpi	1 Part
15	Padmakashta	1 Part
16	Shankhapushpa	1 Part
17	Water	16x6 Parts

hod of Preparation

ne part of the above mentioned dravya are made into Coarse powder has to n in the vessel and 6 parts of water to be added and soaked over night. Next oaked and softened drug is rubbed well and filtered through the cloth and used

pana: Sugar

ation:

Rakta vikara, Kandu, Pama, Hastha pada daha, Amlapitta, Jeerna jwara

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Modern Aspect

Hima kalpana is the cold infusion, which involves solvent extraction but without using heat as an enhancer which results in no loss of the volatile compounds. This dosage form may use modern extraction techniques namely agitation or pressurized liquid extraction to enhance the extraction rate using agitation or high pressure.

In the hima method, the activity of immersing herbs in water (solvent) for release of plant juice into the water indicates similarity with maceration which is a modern extraction technique. This indicates that the hima technique uses both solute diffusion and membrane rupturing principles.

Maceration technique uses solute diffusion principle as the solute (compounds soluble in the solvent) move from high concentration medium (cell cytoplasm) to low concentration medium (solvent/water). This process is accelerated by the use of agitation, which aids in increasing the interaction between the solvent and the raw material by increasing the contact surface area. In addition, the solvent used may aid in membrane rupturing either by creating osmotic shock or by cell membrane disruption/dissolution.

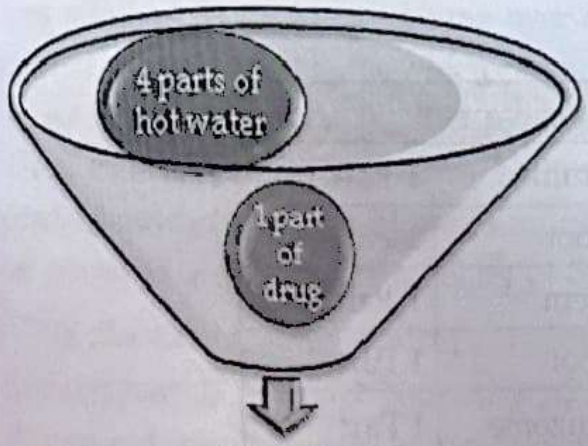
Phanta

Definition

क्षिप्तोष्ण तोये मृदितं तत् फाण्टं परिकीर्तितम्। (Cha.Sam.Su.St. 4/7)

The preparation where the dravya is put into boiled water, squeezed after sometimes and filtered to get filtrate is called as Phanta kalpana.

क्षुण्णे द्रव्यपले सम्यग् जलमुष्णं विनिक्षिपेत्। मृत्पात्रे कुडवोन्मानं ततस्तु स्रावयेत् पटात्।।
(Sha.Sam.Ma.Kha. 3/1)



Phanta

One pala of powdered dravya is steeped in 1 Kudava of hot water and kept in mud pot for sometimes. Later it is filtered through the cloth to get the filtrate. This preparation is called Phanta.

Synonyms: Churna drava

Method of Preparation

4 parts of Water has to be boiled first and then one part of drug in coarse powder form is immersed in it and the vessel is removed from fire. Vessel should be covered with a lid and allow for cooling. When it is lukewarm, it should be rubbed with hands and filtered with cloth and administered.

Principle involved

Phanta is the hot infusion of those herbs which are intended to be used for Kapha and Vata disorders. Phanta kalpana is designed to extract the water soluble extracts from the herbal drugs which are heat sensitive and contains volatile principles. In this procedure, lid has to be closed over the vessel, so that the volatile principles will not evaporate. Boiling water is commonly used as a solvent, since it has a greater solvent action than cold water. This procedure is suitable for the drugs having Vayu and Akasha mahabhoota predominance.

Dose

फाण्टस्तत्र्यानंद्विपलोन्मितम्। (Sha.Sam.Ma.Kha. 3/2)

The dose of Phanta is 2 Pala (96 ml)

Prakshepaka Dravyas and Their Quantity

मधुश्वेतागुडादींश्च क्वाथवत्तत्र निक्षिपेत्। (Sha.Sam.Ma. Kha.3/2)

Madhu, Shweta (Sita), Guda and other prakshepaka dravyas are to be used same as that of Kwatha.

Shelf life: Instant use

General Uses of Phanta

- It is a laghu kalpana and can also be given to alpa agnibala person.
- It is used as an Anupana to other preparation like Vati, Churna etc.,

Examples:

Panchakola Phanta

पिप्पलीपिप्पलीमूलं चव्यचित्रकनागरम्। दीपनीयः शृतो वर्गः कफानिलगदापहः॥ (B.R. Jwaradhikara 5/188)

Ingredients

S.No.	Ingredient	Part used	Quantity
1	Pippali	Fruit	1 Part
2	Pippali moola	Root	1 Part
3	Chavya	Stem	1 Part
4	Chitraka	Root	1 Part
5	Shunti	Rhizome	1 Part
6	Water (hot)		5 x 4 Parts

Method of Preparation

- 4 parts of Water has to be boiled first and then one part of above mentioned drug in the form of coarse powder is immersed in it and the vessel is removed from fire.

- Vessel should be covered with a lid and allow for cooling.
- When it is lukewarm, it should be rubbed with hands and filtered with cloth and administered.

Dose: 1-2 pala (48-96 ml)

Action: Deepana

Indication: Kapharoga, Vata roga

Yastimadhu Phanta

Ingredients

S.No.	Ingredient	Part used	Quantity
1	Yashtimadhu	Stem	1 Part
2	Water (hot)		4 Parts

Method of Preparation

- 4 parts of Water has to be boiled first and then one part of Yashtimadhu in the form of coarse powder is immersed in it and the vessel is removed from fire.
- Vessel should be covered with a lid and allow for cooling.
- When it is lukewarm, it should be rubbed with hands and filtered with cloth and administered.

Dose: 1-2 pala (48-96 ml)

Indication: Kasa, Shwasa, Peenasa, Kantashoola

Modern Aspect

Phanta dosage form can be correlated to hot infusion, which uses solvent extraction along with heat followed by cooling over a period of time. This dosage form can use modern extraction techniques which can be performed at less than boiling temperature like hot solvent extraction, soxhlet extraction and ultrasound-assisted extraction. Hot solvent extraction technique uses both membrane rupturing and solute diffusion principles owing to the use of both heating and solvent as they would cause increased cell permeability and higher mobility of compounds.

In phanta, the activity of filtering the solvent to separate it from the unwanted plant components indicates similarity with the modern separation technique namely filtration and use of size-exclusion principle. In addition, the use of heat with solvent and gradual cooling of solvent in the extraction step could cause additional compound separation in two phases. In the initial phase when solvent is hot, volatile compounds could be imbibed into the solvent and closing the lid prevents its loss by evaporation and in the second phase when the solvent is cooled down, adsorption of various

extracted compounds on the surface of the insoluble part of the herb could happen. The adsorption phenomenon may become more dominant with use of multiple herbs as different herbs can provide different solid phase matrix.

Upkalpana (Secondary Dosage Forms)

Churna

Churna is the upakalpana of Kalka kalpana. It is the form of medicine where the drug is made into fine powder. Churna is the dried form of Kalka. It has more shelf life than kalka kalpana and its potency can be further increased by the process of bhavana.

Definition

अत्यन्तशुष्कं यद् द्रव्यं सुपिष्टं वस्त्रगालितम्। तत् स्याच्चूर्णं रजः क्षोदस्तन्मात्रा कर्षसम्मिता।।

(Sha.Sam.Ma.Kha. 6/1)

शुष्क पिष्टः सूक्ष्मतान्नव पटच्युतः चूर्णः। तस्य समस्त द्रव्यापरित्यागात् प्लुतोपयोगाश्च कल्काद् भेदः।।

(A.Sam.Ka.St. 8/10)

Churna is a dry powder obtained by thorough pounding of the dry drugs and filtering through the cloth. It is also called as Rajaha and Kshoda and administered in the dose of 1 Karsha (12 gms). Acharya Vagbhata defines Churna as a dry fine powder, filtered through a cloth and he says that Churna is a type of Kalka.

Synonyms

Churna, Rajaha, Kshoda

Types

Based on the particle size, Churna is classified into 3 types and they are used for different purposes:

S.No.	Types of Churna	Powder	Sieve size	Uses
1	Sthula	Coarse powder	18-20	Kwatha, Hima, Phanta preparation
2	Sukshma	Fine powder	60	Vati kalpana, internal administration
3	Atyanta sukshma	Very Fine powder	100	Internal administration, Nasya (pradhamana nasya)

Prakshepaka dravyas and their quantity

चूर्णे गुडः समो देयः शर्करा द्विगुणा भवेत्। चूर्णेषु भर्जितं हिङ्गु देयं नोत्क्लेदकृद्भवेत्।।

लिहेच्चूर्णं द्रवैः सर्वैर्घृताद्यैर्द्विगुणोन्मितैः। पिबेच्चतुर्गुणैरेव चूर्णमालोडितं द्रवैः।। (Sha.Sam.Ma.Kha. 6/2-3)

The prakshepaka dravyas which are added with Churna should be administered in the below mentioned quantity.

CHAPTER SIX

Prakshepaka dravyas	Quantity
Guda	Equal
Sita	Double
(Ghrita) Bharjita Hingu	Quantity which does not cause nausea
When licked with Ghrita, Madhu etc.,	Double
When with liquids (water, ksheera etc.,)	Four times

Principle Involved

Churna is the dry form of kalka. Kalka should be used immediately as it deteriorates quickly and cannot be stored for a longer duration. Hence for convenience and to enhance the shelf life, churna kalpana is formulated as they can be preserved and used for longer duration because of their low moisture content. Churnas are more stable than other liquid preparations because drugs undergoes chemical degradation more rapidly in liquid than in powder form. It is designed as solid dosage form as the drug compatibility is also more in solids than other liquid preparations.

Churnas are prepared in different sizes based on their uses and applicability. Sthoola churna are meant to use in preparations like Kwatha, Hima etc, where its form facilitates proper extraction of water soluble extracts. Sookshma churna are fine powder intended for internal administration and external application. As the particle size is very small, the onset of action or bio-availability of churna will be rapid. Atyanta sookshma churna (very fine powders) are formulated to enhance its absorption through nasal mucous membrane when administered in the form of nasya.

Dose

.....तन्मात्रा कर्षमम्मिता: ।। (Sha.Sam.Ma.Kha. 6/1)

Dose of the Churna is 1 karsha (12 gms)

Anupana

चूर्णावलेहगुटिकाकल्कानाम् अनुपानकम्। वातपित्तकफातङ्के त्रिद्वय्येकपलमाहरेत्।। (Sha.Sam.Ma.Kha. 6/4)

The quantity of Anupana for the preparations Churna, Avaleha, Gutika and Kalka in Vataja, Pittaja and Kaphaja rogas should be 3 pala, 2 pala and 1 pala respectively.

Rogas	Anupana pramana
Vataja roga	3 pala (144 ml)
Pittaja roga	2 pala (96 ml)
Kaphaja roga	1 pala (48 ml)

Shelf Life

मासद्वयात् तथा चूर्ण हीनवीर्यत्वमाप्नुयात्। (Sha.Sam.Pra.Kha. 1/55)

According to Sharangadara- 2 months

According to revised guidelines- 2 years

General Uses of Churna

- Churna can be administered orally in various disease condition as an effective dosage form.
- It is also used externally for Lepa, Udvartana, Avachurnana etc.,
- Sukshma churna is used in preparing various secondary preparations like Vati, Avaleha and others; whereas Sthoola churna is used in preparing Kashaya, Hima, Phanta etc.,
- It is used as an adjuvant along with other solid or liquid preparation.
- It serves as an important constituent in the formulation of secondary preparations like Ghrita, Taila, Vati etc.,

Advantages

- Churna gets digested, absorbed and metabolized and assimilated easily and does not need further disintegration unlike guggulu or vati kalpana, leading to early onset of action.
- Dose fixation is more easier when compared with other preparations
- Churnas are more economical and easy for transportation
- Churnas can be effectively administered in a very large dose by mixing with different anupanas
- Several churnas can be mixed together for administration which allow for its great deal of versatility

Disadvantages

- Patients acceptance will reduce if the drugs which are not having good palatability are administered in Churna form.
- Drugs which deteriorate if exposed to atmosphere cannot be formulated into Churna form.
- If the drug contains volatile oil then it is not advised to make Churna form.
- Drugs having hydrophilic and hygroscopic property cannot be dispensed in Churna form.

Quality Control Parameters For Churna

1. Colour
2. Odour
3. Microscopic characters

4. Particle size
5. Total ash
6. Acid- insoluble ash
7. pH (5% aqueous extract)
8. Water- soluble extractive
9. Alcohol -soluble extractive
10. Loss on drying at 105°C/Moisture content
11. Tap Density & Flow Density (angle of repose)
12. TLC/HPTLC/HPLC/LC-MS
13. Test for heavy/toxic metals- Lead, Cadmium, Mercury, Arsenic,
14. Test for metals/non metals- Magnesium, Carbonate, Aluminum, Iron and chloride
15. Pesticide residue- Organochlorine pesticides, organophosphoras pesticides, Pyrethroids (Limits as per ASU Pharmacopoeia)
16. Microbial contamination- Total bacterial count, Total fungal count
17. Test for specific pathogen- Escherichia coli, Salmonella spp., Staphyloccocus aureus, Pseudomonas, aeruginosa (Limits as per ASU Pharmacopoeia)
18. Shelf life

Examples:

Sitopaladi Churna

सितोपला षोडश स्यादष्टौ स्याद्वंशरोचना।।१३४।।
पिप्पली स्याच्चतुष्कर्षा स्यादेला च द्विकार्षिकी। एकः कर्षस्त्वचः कार्यश्चूर्णयेत् सर्वमेकतः।।१३५।।
सितोपलादिकं चूर्णं मधुसर्पिर्युतं लिहेत्। श्वासकासक्षयहरं हस्तपादाङ्गदाहजित्।।१३६।।
मन्दाग्निं सुप्तजिह्वत्वं पार्श्वशूलमरोचकम्। ज्वरमूर्ध्वगतं रक्तं पित्तमाशु व्यपोहति।।१३७।।

Sha.Sam.Ma.Kha. 6/134-137 (AFI Part 1, Vol. 1 A, Pg. 348),

Ingredients

S.No.	Ingredient	Part used	Quantity
1	Sita		16 Karsha (192 g)
2	Vamshalochana	Silicacious Concretion	8 Karsha (96 g)
3	Pippali	Fruit	4 Karsha (48 g)
4	Ela (Sukshma ela)	Seed	2 Karsha (24 g)
5	Twak	Stem Bark	1 Karsha (12 g)

Method of Preparation

- All the ingredients are taken in the specified proportion and powdered separately.

- Sieve the powdered drugs and mixed them in Khalwa yantra.
- Later they are triturated in Khalwa yantra to get homogenous mixture and stored in air tight container.

Dose: 1 karsha (12 gms)/day in divided dose

Anupana: Ghee, honey.

Bheshaja sevana kala: Muhurmuhu (Repeatedly)

Important Therapeutic Uses

Arochaka, Agnimandya, Pittaja swasa, Jvara, Kasa, Hasta Pada Daha, Parshva shula, Kshaya, Suptajihvatva, Urdhvagata Raktapitta.

Hingvastaka Churna

त्रिकटुकमजमोदा सैन्धवं जीरके द्वे समधरणधृतानामष्टमो हिङ्गुभागः
प्रथमकवलभोज्यः सर्पिषा संप्रयुक्तो जनयति जठराग्निं वातगुल्मं निहन्ति।।

B.R, Agnimandyadirogadhikara: 37 (AFI Part 1, Vol. 1 A, Pg. 353)

Ingredients

S.No.	Ingredient	Part used	Quantity
1	Shunti	Rhizome	1 Part
2	Maricha	Fruit	1 Part
3	Pippali	Fruit	1 Part
4	Ajamoda	Fruit	1 Part
5	Saindhava Lavana	Fruit	1 Part
6	Shweta Jeeraka	Fruit	1 Part
7	Krishna Jeeraka	Fruit	1 Part
8	Hingu - shuddha	Exudate	1/8th Part

Method of Preparation

- All the ingredients are taken in equal quantity and powdered separately.
- Sieve the powdered drugs and mixed them in Khalwa yantra.
- Hingu must be fried with little Ghrita and powdered.
- Later all the powdered drugs are triturated in Khalwa yantra to get homogenous mixture and stored in airtight container.

Dose: ½ karsha (6 gms) twice daily

Anupana: Ghee

Bheshaja sevana kala: Prathama kavala (first bolus of the food)

Important therapeutic uses: Agnimandya, Shula, Gulma, Vataroga.

Modern Aspects

Churna can be correlated with the powder dosage form. The term 'Powder' may be used to describe: The physical form of a material, that is, a dry substance composed of finely divided particles.

Definition

Pharmaceutical Powders are intimate mixtures of dry, finely divided drugs and/or chemicals that may be intended for internal (oral powders) or external (topical or dusting powder) use.

Powders represent one of the oldest dosage forms. It is a preparation in which drug is blended with other powdered substances and used for internal or external purpose. Powder as a dosage form permits drugs to be reduced to a very fine state of division, which often enhances their therapeutic activity or efficacy by an increase of dissolution rate and/or absorption.

Classification

Powders are subdivided which are classified in BP (British pharmacopeia) according to size of their constituent particles of range from 1.25 µg to 1.7 mm in diameter. Another classification of powders is based on the manner of their dispensing. They are

- Divided powders.
- Simple and compound powders for internal use.
- Powders for reconstitution.
- Bulk powders for internal use :–
  - Oral bulk powders for internal use.
  - Antacid Oral bulk powders for reconstitution for internal use.
  - Injectable bulk powders for reconstitution for internal use.
- Bulk powders for external use.
- Dust.
- Douches.
- Dental Insufflations
- In snuff
- Effervescent granules

Evaluation of Powder

Pharmaceutical powders are evaluated for following quality control parameters

- Content uniformity

- Particle size and size distribution
- Flow property
- Angle of repose
- Flow rate Density
- Bulk density, tapped density and true density
- Hausners ratio
- Moisture content, Tensile and cohesive strength measurements
- Safety and efficacy
- Stability

Pramathya

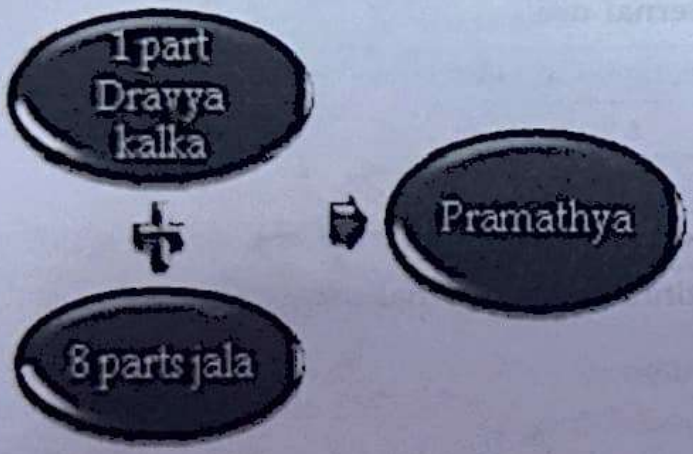
Pramathya is Upakalpana of Kwatha Kalpana. It is slightly different from Kwatha Kalpana. The drugs are added in the form of Kalka. Pramathya should be used in Madhyama Doshavastha, it is Guru in nature than Kwatha Kalpana. Hence it should be used in persons having good digestive capacity.

Definition

प्रमथ्या प्रोच्यते द्रव्यपलात् कल्कीकृताच्छृतात् । तोयेऽष्टगुणिते तस्याः पानमाहुः पलद्वयम।।१५०।।

(Sha.Sam.Ma.Kha. 2/150)

Pramathya is the preparation obtained by boiling one pala (48 gms) of dravya in the form of kalka and eight times (384 ml) of water. This drink is administered in the dose of 2 pala (96 ml.).



Method of Preparation

One part of drug is taken in the form of Kalka and boiled in eight parts of water and reduced to ¼th. Later it is filtered and used.

Principle involved

The principle behind the Pramathya kalpana is that the total solid contents are more in it as the drug is added in the form of Kalka which has smaller particle size than coarse powder. Hence, it is more potent than Kwatha and to be used in those having good Agni bala.

Dose: 2 Pala (96 ml)

Shelf life: Instant use

Examples:

Mustadi Pramathya

मुस्तकेन्द्रयवैः सिद्धा प्रमथ्या द्विपलोन्मिता। सुशीता मधुसंयुक्ता रक्तातीसारनाशिनी।।१५१।।

(Sha.Sam.Ma.Kha. 2/151)

Ingredients

S.No.	Ingredient	Quantity
1	Musta	1 Part
2	Indrayava	1 Part
3	Water	16 Parts

Method of Preparation

One part of Musta and Indrayava are made into Kalka form and boiled in eight times of water and reduced to ¼th. Later it is filtered and used.

Dose: 2 Pala (96 ml)

Anupana: Madhu

Indication: Rakta Atisara

Aushadha Siddha Paniya

Aushadha siddha paniya is a medicated water. It is less concentrated drink as it contains lesser amount of drugs and also lesser amount of reduction.

Definition

क्षुण्णं द्रव्यपलं साध्यं चतुःषष्टिपले जले। अर्धशिष्टं च तद्देयं पाने भक्तादिसंविधौ।। (Sha.Sam.Ma.Kha. 2/157)

One pala of dravya is boiled in 64 palas of water and reduced to half of its quantity. This preparation is called Aushadha siddha paniya and used as a drink and in making different dietary preparations.

Method of Preparation

One part of drug made into coarse powder and boiled in 64 parts of water till the whole content reduced to ½. It is then filtered and used for drinking or to prepare pathya kalpanas like Manda, Yusha etc.,

Principle Involved

The principle behind this dosage form is that one can use medicated water for drinking purpose and preparing various dietary form instead of using plain water, especially in disease condition.

Dose: 2 Pala (96 ml)

Shelf life: Instant use

Examples:

Shadanga Paniya

उशीरपर्पटोदीच्यमुस्तनागरचन्दनैः। जलं श्रृतं हिमं पेयं पिपासाज्वरनाशनम्।। (Sha.Sam. Ma. Kha.3/158)

Ingredients

S.No.	Ingredient	Quantity
1	Usheera	1 Karsha (12 g)
2	Parpata	1 Karsha (12 g)
3	Udeechya	1 Karsha (12 g)
4	Musta	1 Karsha (12 g)
5	Nagara	1 Karsha (12 g)
6	Chandana	1 Karsha (12 g)
7	Water	6 Prashtha (4608 ml)

Method of Preparation

One part of the above drugs are made into coarse powder and boiled in 64 parts of water till the whole content reduced to ½. It is then filtered and can be used.

Dose: 2 pala (96 ml.)

Indication: Pipasa (Thirst), Jwara (Fever)

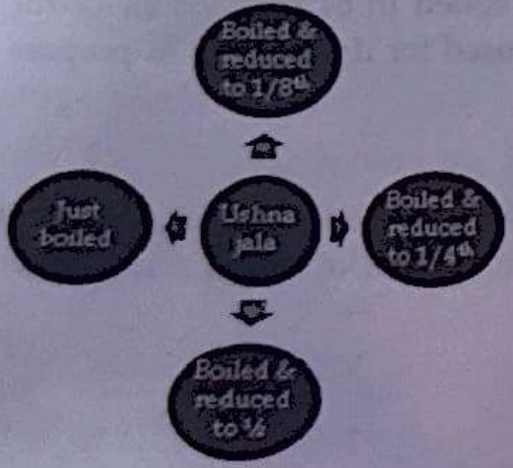
Ushnodaka

Ushnodaka is usually used for the purpose of anupana, taken along with various medicaments. It is preferred to be used during night time.

Definition

अष्टमेनांशशेषेण चतुर्थेनार्धकेन वा। अथवा क्वथनेनैव सिद्धमुष्णोदकं वदेत्।। (Sha.Sam. Ma. Kha.3/159)

Ushnodaka is the boiled water, which is reduced to ⅛th, ¼th, ½ of its original quantity or just boiled for some times.



क्वाथ्यमानन्तु यत्तोयं निष्फेनं निर्मलीकृतम्। भवत्यार्द्धविशिष्टन्तु तदुष्णोदकमिष्यते।। (Sha.Sam.Ma.Kha. 3/59)

Boiling of water and reducing it to half of its original quantity and which is clean and free of froath or foam is called as ushnodaka.

Method of Preparation

Ushnodaka is prepared by boiling water over moderate fire and reducing it to ⅛th, ¼th, ½ as per the requirement.

Principle involved

Water, when boiled becomes laghu due to the agni samskara, so get absorbed easily and also stimulates agni for proper digestion as well as elimination of waste. And also by boiling, water attains sookshma guna, by which it can penetrate the sookshma srotas, eliminates the toxins and assimilation of nutrients. Hence Ayurveda recommends drinking of Ushnodaka both in healthy and diseased status. Various types of Ushnodaka are described to facilitate its selection according to the condition of Dosha, Desha and Rutu.

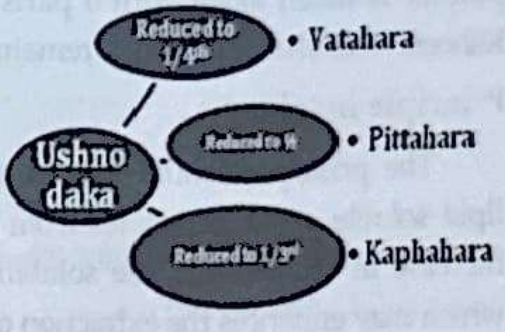
Action and Indication

श्लेष्मामवातमेदोघ्नं बस्तिशोधनदीपनम्। कासश्वासज्वरहरं पीतमुष्णोदकं निशि।। (Sha.Sam.Ma.Kha. 3/160)

Ushnodaka taken at bed time reduces Kapha, Ama, Vata and Medas, it does basti shodhana and deepana, it will also help in curing Kasa, Shwasa and Jwara.

तत्पादहीनं वातघ्नं अर्धहीनन्तु पित्तजित्। त्रिपादहीनं श्लेष्मघ्नं संग्राह्यग्निप्रदं लघु।

Ushnodaka prepared by reducing ¼th of it is Vatahara, reducing ½ is Pittahara and that which is reduced to ¾th of it Kaphahara, sangrahi, increases Agni and it is light for digestion.



पादावशेषं सलिलं ग्रीष्मे शरदि शस्यते।
हेमन्ते शिशिरे वर्षास्वर्धहीनं प्रशस्यते।
शृतशीतं सदा पथ्यं लघुनीरे त्रिदोषनुत्। (Madana vinoda)

Ushnodaka prepared by reducing to ¼th is preferred to be use in Greeshma and Sharad rutu, that which is reduced to ½ has to be used in Hemantha and Shishira and varsha rutu. Boiled and cooled water is pathya, always, light for digestion and pacifies Tridoshas.

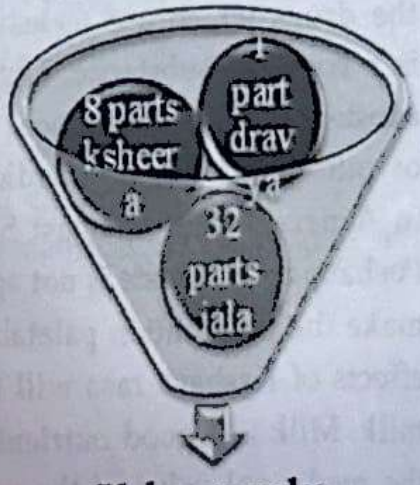
Ksheerapaka

Ksheerapaka is one of the upakalpana of Kwatha kalpana where milk is used along with water as menstrum.

Definition

क्षीरमष्टगुणं द्रव्यात् क्षीराच्नीरं चतुर्गुणम्। क्षीरावशेषं कर्तव्यं क्षीरपाके त्वयं विधिः। (Sha.Sam.Ma.Kha. 2/161)

Ksheerapaka is prepared with one part of prescribed drug, eight parts of milk and 32 parts of water (1:8:32). Mixture is boiled on moderate heat and boiled till only milk part remains in the vessel. [i.e., ¼th]. It relieves abdominal pain arisen due to Ama.



Ksheerapaka

Method of Preparation

क्षीरं तिथिगुणं द्रव्यात् क्षीरात्नीरं समम् मतं। क्षीराव शेषं तत्पीतं क्षीरपाके त्वयं विधि।। (Dra.Vi.G)

According to Yadavaji Trikamaji Acharya, for one part of drug, 15 parts of milk and 15 parts of water (1:15:15) are to be added and boiled till only the milk part remains for the preparation of Ksheerapaka.

In Bhaishajya Ratnavali, while describing the method of preparation of lashuna ksheerapaka, he had told to boil one part of drug with 8 parts of milk and 8 parts of water (1:8:8) till the milk part remains.

क्षीरादिसहितं च द्रव्यं सम्यङ्मुक्तरसं भवतीति वारिक्वाथपूर्वकं क्षीराद्यैस्तदुपदेशे अनुपदग्धं क्वाथयेत्।। (A.S.Ka. 8/12)

According to Vagbhata, when the drug is boiled along with water and milk, proper extraction will not be possible. So he advises to prepare Kwatha of the drug by boilng with water and after filtration, equal quantity of milk is added and boiled till the milk part remains.

Though different references of Ksheerapaka preparation are available, generally the method told by Sharangadhara is adopted. One part of drug in the form of coarse powder is taken along with 8 parts of milk and 32 parts of water and boiled till the Ksheeravashesha (milk parts remains i.e., $\frac{1}{8}^{th}$)

Principle involved

The principle behind ksheera paka kalpana is to extract both water soluble and lipid soluble active principles from the drug. In any preparation of milk, on gradual increase in temperature the solubility of fat and protein in the media also increases which may enhances the extraction of the medicinally important active constituents and retains in the media. It would also be supportive in the absorption of the medicament. As milk is a colloidal solution it is most efficient media for extraction of medicaments and can be easily absorbed through the body membranes.

As per Ayurveda, use of Ksheerapaka Kalpana is mentioned specially with the drugs which are teekshna (toxic) or astringent in taste. Fat present in milk is a colloidal substance. Digestion, absorption and assimilation of these colloidal substances are slow. Hence, the toxic effect of a teekshna dravya will be reduced or minimised but the medicinal effect of the drug will be prolonged. It is said in Ayurveda that amongst Shad rasas, Kashaya rasa has the least value of Dhatu Poshana and its taste is not agreeable. To minimise the effect of Kashaya rasa and to make the preparation palatable, Ksheerapaka form will be of great help. Unwanted effects of Kashaya rasa will be subdued by Madhura rasa and Madhura vipaka of milk. Milk is a good nutrient. It has a rich protein and calcium. Hence, along with the medicinal value of the preparation, even the nutritional balance is maintained

by these Ksheerapaka preparations. Milk also act as a carrier which deliver such phytochemicals to targeted cells.

Advantages

- Ksheerapaka can be used as a medicament and nutrient.
- It is an effective preparation for pitta prakruti persons and for pittaja vyadhis.
- The preparation media (milk) helps to reduce teekshnatva/toxicity of teekshna dravyas like Bhallataka.
- Preparations are palatable and good for heart.
- Ksheerapaka Kalpana is advised even to a person having low digestive capacity.
- The effect of the drug is prolonged because of the fat(colloidal substance) present in the milk.
- Ksheerapaka Kalpana is mostly useful for aged people and children as they can easily take such a dosage form and it also provide nourishment

Dose

2 pala (96 ml)

Prakshepaka dravya : Sita

Shelf life: Instant use

Examples:

Lashuna Ksheerapaka

साधयेत् शुद्धशुष्कस्य लशुनस्य चतुष्पलम। क्षीरोदकेऽष्टगुणिते क्षीरशेषञ्च पाययेत्।।

(B.R. Gulma Chikitsa 32/13)

Ingredients:

S.No.	Ingredient	Part used	Quantity
1	Lashuna	Bulb	1 Part
2	Goksheera		8 Parts
3	Water		8 Parts

Method of Preparation

- One part of Lahuna bulb, eight parts of milk and eight parts of water is boiled on moderate heat and boiled till only milk part remains in the vessel. [i.e., $\frac{1}{8}^{th}$]
- Later, it is filtered and used.

Dose: 2 pala (96 ml)

Anupana: Sita or Madhu

Action: Agni deepaka, Ama pachaka

Indication: Amavata, Jwara, Sandhivata, Vata rogas

Arjuna Ksheerapaka

अर्जुनस्य त्वचा सिद्धं क्षीरं योज्यं हृदामये। भग्नः पिबेत्वक् पयसार्जुनस्य।। (C. P)

Ingredients

S. No.	Ingredient	Part used	Quantity
1	Arjuna	Stem bark	1 Part
2	Goksheera		8 Parts
3	Water		32 Parts

Method of Preparation

- One part of Arjuna Khanda twak made into coarse powder is boiled by adding eight parts of milk and 32 parts of water on moderate heat and boiled till only milk part remains in the vessel. [i.e., ⅛th]
- Later, it is filtered and used.

Dose: 2 pala (96 ml)

Anupana: Sita or Madhu

Indication: All types of Hrdroga, Bhagna

Laksha Rasa

Laksha is resinous substance of the plant Laccifer lacca which is a reddish to dark brown in colour. Laksha rasa is water extract prepared by removing unwanted sticky materials.

Definition

षडगुणेनाम्भसा लाक्षा दोलायन्त्रे ह्युपस्थिता। त्रिसप्तधा परिस्राव्या लाक्षा रसमिदं विदुः।। (Dra.G.Vi)

Laksha rasa is water extract obtained by boiling one part of Laksha with 6 parts of water in Dola yantra and filtered for 21 times.

Method of Preparation

1 part of Laksha is tied in pottali and suspended in Dolayantra containing 6 parts of water and boiled over moderate fire till the water reduced to ¼th and the essence of Laksha comes into the water. Later the liquid part is collected and filtered through cloth for 21 times and used.

Principle involved

Laksharasa is prepared from Sticky Laksha with the aim to get its extract only but not its sticky particles so it is strained twenty one times.

Dose: 2 tola (24 ml)

Anupana: Sita

Shelf life: Instant use

Action: Grahi, Sthambaka

Indication: Asrkdhara, Yoniroga, Raktapitta, Raktarshas, Abhighataja vrana

Mamsa Rasa

Mamsa rasa is the soup prepared by boiling the mamsa with water. It is described under Pathya kalpana. As its preparation involves the kwathana (boiling) process, this is categorised under the upakalpana of Kwatha kalpana.

Method of Preparation

रसे साध्यं जलं देयं मांसं सिध्यति यावता। पलाष्टकंजलेप्रस्थे घनेऽथ मध्यमे तु षट्।।
मांसस्य वंटनं कुर्यात्कुडवं तनुके रसे। (Dra.G.Vi)

Mamsa rasa is prepared by boiling the meat with appropriate quantity of water, which depends on the consistency required. To obtain thick (Ghana) consistency of mamsa rasa, 2 parts of water is added to boil with 1 part of mamsa, for moderate (Madhyama) consistency, 2.6 parts of water and for thin (Tanu) consistency, 4 parts of water should be added to 1 part of mamsa to boil till the mamsa get properly cooked and it becomes soft. Later liquid part is strained for use.

Principle Involved

The principle behind Mamsa rasa is to prepare an appetizing and easily digestible preparation by extracting nourishment and flavour from the meat to the water.

Types

अस्नेहं लवणं सर्वं अकृतं कटुकैर्विना। विज्ञेयं लवणस्नेहकटुकैः संयुतं कृतम्। (Su.Sam.Su.St. 46)

Based on the ingredients used and the method of preparation, mamsa rasa is of two types:-

1. Kruta Mamsa rasa
2. Akruta Mamsa rasa

Akruta Mamsa rasa is a plain meat soup prepared by boiling mamsa with water and without adding any other ingredients, whereas Kruta Mamsa rasa is a meat soup prepared by boiling mamsa with water and then Sneha, Lavana, Ardraka and other spices are added in small quantity.

Action and Indication

प्रीणनः सर्वभूतानां हृद्यो मांसरसः परम्। शुष्यतां व्याधिमुक्तानां कृशानां क्षीणरेतसाम्।
(Cha.Sam.Su. St.27/312-13)

Mamsa rasa does preenana and it is Hridya. It is useful in person having Dhatukshaya, weak after chronic illness, Krusha (emaciated person) and Ksheena retas (decreased semen count). It acts as nector who wishes to have good bala (physical strength) and varna (complexion).

Mantha

Mantha kalpana is considered as Phanta bheda according to Sharangadhara. But hot water is added in the Phanta kalpana, so this cannot be categorised under Phanta kalpana, as Mantha kalpana involves the addition of cold water. Hence it is appropriate to categorised under the Hima kalpana. The process is called as Mantha kalpana because it involves Manthana or Churning.

Definition

जले चतुष्पले शीते क्षुण्णं द्रव्यपलं क्षिपेत्। मृत्पात्रे मन्थयेत्सम्यक् तस्माच्च द्विपलं पिबेत्।

(Sha.Sam.Ma.Kha. 3/9-10)

One pala of coarsely powdered drug is added to four palas of cold water in a pot and churned well to obtain thick consistency. This preparation is called mantha and administered in the dose of 2 pala.

नातिद्रवा नाति सान्द्र मन्थ इत्युपदिश्यते। (Su.Sam, Su. St.46/385)

Mantha is advised to prepare with a consistency which is neither thick nor thin.

Method of Preparation

One part of drug is made into coarse powder and soaked in 4 parts of water. Then the contents are churned to obtain the consistency which is neither thick nor thin. Later it is filtered and used.

Principle involved

Mantha kalpana is designed as a triturated extraction instead of direct heating to obtain complete nutritional value.

Dose: 2 palas (96 ml)

Prakshepaka dravyas and their quantity: Sita, Madhu, Guda

Shelf life: Instant use

Action and Indication

मन्थः सद्योबलकरः पिपासा श्रमनाशनः। स आम्ल स्नेह गुडो मूत्रकृच्छ्रोदावर्तनाशनः।
शर्करेक्षुरस द्राक्षायुक्तः पित्तविकारनुत्। द्राक्षा मधूकसंयुक्तः कफरोगनिबर्हणः।
वर्गत्रयेणोपहितो मलदोषानुलोमनः। (Su.Sam, Su. St.46/386-387)

- Mantha provides instantaneous energy, allays thirst and relieves exhaustion.

- Mantha prepared of Amla rasa dravya, if administered with sneha and guda pacifies Mutrakrucchra and Udavarta.
- Mantha pacifies all Pitta vikaras when it is prepared with Sharkara, Ikshurasa or Draksha.
- Mantha prepared with Draksha and Madhuka cures Kaphaja rogas.
- Mantha prepared with all the above drugs acts Malashodhaka.

Examples:

Karjuradi Mantha

Ingredients

खर्जूरदाडिमीद्राक्षातिन्तिडीकाम्लिकामलैः। सपरूषैः कृतो मन्थः सर्वमद्यविकारनुत्। (Sha.Sam.Ma.Kha.3/10-11)

Ingredients

S.No.	Ingredient	Part used	Quantity
1	Karjura	Fruit	1 Part
2	Dadima	Seed	1 Part
3	Draksha	Fruit (dry)	1 Part
4	Tintidika	Fruit	1 Part
5	Amlika	Fruit	1 Part
6	Amalaka	Fruit	1 Part
7	Parushaka	Fruit	1 Part
8	Water		28 Parts

Method of Preparation

One part of all the fruits mentioned above are taken, crushed into small pieces and soaked in 4 times of water for 2-4 hours. Then the contents are churned to obtain the consistency which is neither thick nor thin. Later it is filtered and used.

Dose

2 palas (96 ml)

Important Therapeutic Uses

Sarva madhya vikara (Alcoholic disorders)

Udaka Kalpana

Udaka kalpana is the upakalpana of Hima kalpana. These preparations are usually used as anupana.

Method of Preparation

Dravya made into coarse powder is soaked in water for sometimes. Then the dravya is rubbed well, filtered and used. There are different opinions about the quantity of water to be added.

Principle Involved

The principle behind this preparation is to extract water soluble constituents by soaking and rubbing techniques.

Dose: 2 palas (96 ml)

Prakshepaka dravyas: Sita, Madhu, Guda

Shelf life: Instant use

Examples:

Tandulodaka

तण्डुलं कणशः कृत्वा पलं ग्राह्यम् हि तण्डुलात। चतुर्गुण जलं देयं तण्डुलोदक कर्मणि।। (S.Y.M)

कण्डितं तण्डुलपलं जलेऽष्टगुणिते क्षिपेत्। भावयित्वा जलं ग्राह्यं देयं सर्वत्र कर्मसु।। (Sha.Sam.Ma.Kha. 1/28)

Ingredients

S.No.	Ingredient	Part used	Quantity
1	Tandula (Rice)	grain	1 part
2	Water		4/6/8 parts

Method of Preparation

One part of dehusked, clean and washed broken rice is soaked in 8 parts of water. Even there are references to add 4 parts or 6 parts of water. After 1-2 hours of soaking, rice is rubbed well and strained to get Tandulodaka.

Dose: 2 palas (96 ml)

Anupana: Sita, Madhu, Guda

Action: Pittashamaka, Mutrala

Indication: Mutra daha, Alpa mutrata, Hasta pada daha; it is used as anupana along with Pushyanuga churna in Shweta pradara and menstrual disorders.

Panaka

There are no classical references for Panaka kalpana. Acharya Yadavji included this kalpana into Ayurveda pharmaceutics in 20th century.

Definition

Panaka kalpana is the preparation of juice using citrus fruits by adding sugar and some spices like Maricha, Jeeraka, salt and others in a pinch quantity.

Method of Preparation

फलाम्लमनम्लं जलेस्विन्नं शीताम्बु परिमर्दितम्। सिता मरीच संयुक्तं पूतं स्यात् पानकं वरम्।।

(Dravyaguna Vignana 1/30)

Panaka is prepared by steaming the citrus fruits like Tamrind, grapes, lemon etc., and then by extracting the juice. Then it is diluted with cold water and mixed with sugar and a pinch of pepper powder and other required powders.

Principle involved

Panaka Kalpana is meant to get benefits of sugar syrup and juicy fruits with added flavors to enhance its taste in order to provide relief from excessive water loss from body.

Dose: 2 palas (96 ml)

Prakshepaka dravyas: Sita, Madhu, Guda

Shelf life: Instant use

Action: Pitta shamaka, Sadyobalakara, Daha and Trishna nivaraka

Examples:

Chincha Panaka

भागास्तु पञ्च चिञ्चायाः खण्डस्यापि चतुर्गुणाः। धान्यकार्द्रकयो र्भागौ चातुर्जातार्द्धभागिकम्।।
त्रिगुणं जलमेतेषामेकपात्रे विलोडितम् । पिहितं तप्तदुग्धेन ततो वस्त्रपरिप्लुतम् ।।

(B.R. Arochaka chikitsa 34-35)

Ingredients

Sl. No.	Ingredient	Quantity
1	Ripe Chincha pulp	5 parts
2	Sarkara	20 parts
3	Dhanyaka	1 part
4	Ardraka	1 part
5	Twak	½ part
6	Patra	½ part
7	Ela	½ part
8	Nagakesara	½ part
9	Water	3 times of all the above mixture

Method of Preparation

The mixture of all the above drugs are added to 3 times of water. To this little quantity of hot milk is added and filtered through the cloth and used.

Dose: 2 palas (96 ml)

Action: Agni deepana, Ama pachana, Grahi

Indication: Arochaka, Agnimandya, Admana, Atopa, Grahani, Vamana, Daha, Trishna

Chincha Panaka (Siddha yoga sangraha)

Ingredients

S.No.	Ingredient	Quantity
1	Ripe Chincha phala (without seeds)	1 part
2	Water	4 parts
3	Sarkara	2 parts
4	Saindava lavana	1/10th part
5	Fried Jeeraka churna	1/10th part
6	Fried Maricha churna	1/20th part

Method of Preparation

1 part of Ripe Chincha phala is soaked in 4 parts of water for 1-2 hours. Later it is rubbed and filtered. Sugar and other powders are added to the filtrate, mixed well and used.

Dose: 2 palas (96 ml)

Action: Agni deepana, Ama pachana, Grahi

Indication: Agnimandya, Aruchi, Admana, Atopa, Grahani, Vamana, Daha, Trishna

Chandana Panaka (Anubhoota yoga)

Ingredients

S.No.	Ingredient	Quantity
1	Shweta Chandana	1 part
2	Water	4 parts
3	Khanda Sarkara	2 parts
4	Jambeera swarasa	1/10th part

Method of Preparation

One part of Shweta chandana is made into coarse powder and soaked in 4 parts of water for 6-8 hours. Then the mixture is rubbed and filtered. Sharkara and Jambeera swarasa is added to the filtrate, mixed well and used.

Dose: 10-20 ml diluted with water

Action: Pittashamaka

Indication: Hastha pada daha, Trishna, Mutra vikara, Jwara, Upadamsha.

Arka

Arka Kalpana is the distillation of various volatile raw drugs with water having good therapeutic value with less dosage and long shelf life. Drugs with essential volatile oil or volatile principles can be used to prepare Arka. The references of this Arka kalpana is available only in Arka Prakasha of Ravana, where there is clear and detailed descriptions about the pharmaceutical aspects of Arka Kalpana.

Method of Preparation

- Dry drug should be powdered and wet drugs should be crushed and then soak it for 4-6 hours or kept overnight.
- Next day morning, it is poured into the Arka yantra(Distillation apparatus) and 10 times of water is added.
- The mixture is continuously boiled in madhyamagni.
- The vapors get condensed and collected in a receiver.
- Heating is stopped when 60% of distillate is collected.
- After cooling, Arka is preserved in a air tight container.

Suitable Vessel For the Collection of Arka

जीर्णास्थिपात्रे गृह्णीयादक वा काच सम्भवे। पाषाणके अथवा पात्रे अभावे मृन्मये न्यसेत्।। (Ar. Pr. 1/87)

Vessels made of Porcelain, Glass, Stone or Mud should be used for the collection of Arka.

Grahya Arka Lakshanas

द्रव्याधिक सौगन्ध्यं यस्मिन्नर्के प्रदृश्यते। जीर्णास्थि पात्र संक्षिप्तो द्रव्यकर्णः प्रदृश्यते।।
शंखकुन्देन्दु धवलोन्यथा पात्रान्तरस्थितः। जिह्वोपरिगतः स्वादं दद्याद्द्रव्यभवं तु यः।। (Ar. Pr. 1/74-75)

- Arka must accomplish with the aromatic odour of the drug
- Arka should be collected and stored in Porcelain or other suitable vessel
- Arka must be clear and transparent liquid.
- It must have the taste of its ingredients.

Agrahya Arka Lakshanas

तमेवार्क विजानीयादन्यस्तु स्याद्रसादिवत्। कृत्वा सुगन्धिमेतस्य ह्यर्कपुष्पादिभिः सुधीः।
गुणाय पश्चात्सेवेत त्वन्यथाऽपगुणो भवेत्। दुर्गन्धं भक्षयेदर्क यदि मोहात्कथञ्चन।। (Ar. Pr. 1/76-77)

- Arka having the bad or unpleasant odour
- If there is change in the taste, colour or any other characteristics of Grahya Arka
- If appearance of Arka is turbid.
- If Arka causes giddiness

Principle involved

Arka kalpana is based on the principle of Distillation, the process of heating a solid-liquid mixture to produce vapor of the liquid and then cooling the vapor to recover the liquid containing volatile principle. Distillation is the process of separating the components of a liquid mixture through selective evaporation and condensation. The basis of separation is the difference in the vapor pressures (volatilities) of the respective components.

Importance of the Arka

- द्रव्यकल्पः पञ्चधास्यात्कल्कक्षूर्णरसं तथा।। तैलमर्क क्रमाज्ज्ञेयं यथोत्तरगुणं प्रिये।। (Ar.Pr. ¼6)

  The efficacy of Kalka, Churna, Swarasa, Taila and Arka is gradually increasing in ascending order, suggesting that Arka is more potent among various formulations
- Arka can be preserved for longer time than other Kalpanas like Swarasa, Kwatha etc.
- Arka is easy to administer in the delicate patients and one who hesitate to take medicines like Churna, Kwatha etc.
- Arkas are having the qualities of Laghupaki, Vyavayi and Vikasi, so assimilates quickly in the body.
- Arkas have good palatability and thus have more patient's acceptance.
- Arka Kalpana acquires highest position in obtaining the potentially active volatile oils as the condensation takes place during the process of distillation.

Dose: 12-24 ml

Anupana: Water

Shelf Life

1-2 years or till Arka remains clear and transparent without any turbidity and retains the characteristic odour and taste

Storage of Arka

Arka should be stored in air tight bottle and places in cool and dry places. Expose to air will lose it volatile constituents. Before using the Arka, bottle should be shake well

Modern Aspects

Arka kalpana can be compared to Distillation. This process is divided into two steps: Evaporation and Condensation. Evaporation is defined as the freely escape of vapor from the surface of liquid. And it is differentiated from the boiling which happens at given pressure. Condensation is the process where the evaporated vapors are converted to liquid by cooling mechanism.

The basic operation of distillation requires the use of a still or retort in which a liquid is heated, a condenser to cool the vapour, and a receiver to collect the distillate. In heating a mixture of substances, the most volatile or the lowest boiling distills first, and the others subsequently or not at all. This simple apparatus is entirely satisfactory for the purification of a liquid containing nonvolatile material and is reasonably adequate for separating liquids of widely divergent boiling points.

Quality Control Parameters For Arka

1. Colour
2. Odour
3. pH
4. Specific gravity at 25°C
5. Boiling point
6. Assay for essential oil (percentage of essential oil)
7. Refractive index
8. Optical rotation
9. Viscosity
10. TLC/HPTLC/GLC/GC-MS (any one or all)
11. Total acidity
12. Test for heavy/toxic metals- Lead, Cadmium, Mercury, Arsenic
13. Pesticide residue- Organo chlorine pesticides, organ phosphorus pesticides, pyrethroids (Limits as per ASU Pharmacopoeia)
14. Microbial contamination- Total viable aerobic count Enterobacteriaceae Total fungal count (Limits as per ASU Pharmacopoeia)
15. Test for specific pathogen Escherichia coli, Salmonella spp., Staphyloccocus aureus, Pseudomonas aeruginosa (Limits as per ASU Pharmacopoeia)
16. Aflatoxins (B1, B2, G1 G2 (Limits as per ASU Pharmacopoeia)
17. Shelf life

Examples:

Ajamodarka (AFI, Part 1, Vol. 1 A, Pg.103)

अजमोदोद्भवो वातकफा बस्तिशोधन: । (Ar.pr.Shataka 3/7)

Ingredients

S.No.	Ingredient	Part used	Quantity
1	Ajamoda	Fruit	1 kg
2	Water for Soaking and for preparation of arka		18 ltr

Method of Preparation

- 1 kg of Ajamoda is to be powdered and soak it in 8 liters of water for 4-6 hours or kept overnight.
- Next day morning it is poured into the Arka yantra (Distillation apparatus) and 10 liters of water is added.
- The mixture is continuously boiled in madhyamagni. The vapors get condensed and collected in a receiver.
- Heating is stopped when 60% of distillate is collected. After cooling, Arka is preserved in air tight container.

Dose: 12 to 24 ml

Action: Deepana, Pachana, Vatanulomana

Important Therapeutic Uses: Agnimandya, Ajeerna, Udara shula, Bastiroga.

Mishreyarka
(AFI, Part 1, Vol. 1 A, Pg.106)

मिश्रेयाया वह्निमान्द्ययोनिशूलकृमीन् हरेत्। (Ar.pr.Shataka 3/10)

Ingredients

S.No.	Ingredient	Part used	Quantity
1	Mishreya	Fruit	1 kg
2	Water for Soaking and for preparation of arka		7 liter

Method of Preparation

- 1 kg of Mishreya is to be powdered and soak it in 2 liters of water for 4-6 hours or kept overnight.
- Next day morning it is poured into the Arka yantra (Distillation apparatus) and 5 liters of water is added.
- The mixture is continuously boiled in madhyamagni. The vapors get condensed and collected in a receiver.
- Heating is stopped when 60% of distillate is collected. After cooling, Arka is preserved in air tight container.

Dose: 12 to 24 ml

Important Therapeutic Uses

Mandagni, Adhmana, Shula, Krimi, Yoni shula

Yavani Arka (API, Part 2, Vol. 3, Pg. 24)

यवान्याः पाचनो रुच्यो दीपनस्त्रिकशूलहृत्। (Ar.Pr.Shataka 3/6)

Ingredients

S.No.	Ingredient	Part used	Quantity
1	Yavani	Fruit	1 kg.
2	Water for Soaking and for preparation of arka		10 liters.

Method of Preparation

- 1 kg. of Yavani is to be powdered and soak it in 2 liters of water for 4-6 hours or kept overnight.
- Next day morning it is poured into the Arka yantra (Distillation apparatus) and 8 liters of water is added.
- The mixture is continuously boiled in madhyamagni. The vapors get condensed and collected in a receiver.
- Heating is stopped when 60% of distillate is collected. After cooling, Arka is preserved in air tight container.

Dose: 12 to 24 ml

Important Therapeutic Uses

Pachaka (Carminative), Ruchikaraka (Increases taste), Dipaka (Digestive)

Indication: Trikashula (Pain in Sacral region)

Gulabarka (API, Part 2, Vol. 3, Pg. 4)

Ingredients

S.No.	Ingredient	Part used	Quantity
1	Gulab	Petals	1 Kg.
2	Water for Soaking and for preparation of arka		10 liters

Method of Preparation

- 1 kg. of Gulab is soaked in 2 liters of water for 4-6 hours or kept overnight.
- Next day morning it is poured into the Arka yantra (Distillation apparatus) and 8 liters of water is added.
- The mixture is continuously boiled in madhyamagni. The vapors get condensed and collected in a receiver.
- Heating is stopped when 60% of distillate is collected. After cooling, Arka is preserved in air tight container.

Dose: 12 to 24 ml

Important Therapeutic Uses

External uses- Netradaha (Burning sensation in eyes), Mukhapaka (Stomatitis)

Internal uses- Atisara, Pravahika

Instruments Used in Small and Large Scale Production

S. No.	Name of the dosage forms	Instruments for small scale production; Ancient equipments	Instruments for large scale production; Modern equipments
1	Swarasa	Khalwa yantra Ullukala yantra	Juice extractor Mixer, wet Grinder
2	Putapaka Swarasa	Laghu puta	Steam cooker
3	Kalka	Khalwa yantra	Mixer Wet grinder
4	Kwatha and its upakalpanas	Mud pot/ vessel boiling over Chullika (stove)using various fuels	Steam jacket boilers Electric boilers Hot plate
5	Hima/ Phanta	Mud pot or ordinary vessel with lid	Agitator Percolators
6	Churna	Khalva Yantra Ullukala Yantra	Pulveriser Disintegrator Ball mill Edge and end runner mill Colloid mill
7	For sieving of churnas	Cloth, Sieves	Metallic sieves with mesh of different sizes along with mechanical sieve shaker
8	Mixing of different churnas	Manual mixing Khalva yantra	Tumbling mixers/blenders Ribbon mixer Planetary mixer orbiting
9	Mantha Kalpana,	Manual churner	Mechanical churner
10	Arka	Arka yantra	Different types of distillation apparatus like simple, fractional, steam, vacuum distillation

Discussion

Pancha vidha kashaya kalpanas are the basic formulations in Ayurvedic pharmaceutics from which various upakalpanas and secondary preparations are made.

The selection of Kashaya kalpanas for treatment purpose depends on various factors like roga, rogibala etc. The use of these kashaya kalpanas were very much reduced because of its short shelf life, lack of proper protocol for testing and practice of this medicine become difficult. All Kalpanas are aimed at isolation of suitable active principles through different media. Application of modern technology has given aesthetic approach to existing and new formulations. So primary preparations are modified into acceptable form with increased shelf life, palatability, easy dispense, global acceptance and marketing standards etc. The selection of these preparations depends on several factors like the desired drug characteristics, environment (season etc.) and patient's prevalent condition (like digestive capability and disease stage).

Though drugs possess medicinal value, they cannot be used in all cases/diseases because they have different potency in different forms. This diverse in its property gave a way in designing the different method of preparation. The Swarasa possess more Gurutva (heavy for digestion) than Kalka followed by Kwatha, Himaand Phanta which means the magnitude of the medicine of the preceding form is greater than succeeding one. The criteria for giving Kalpana for diseased is also based on Vyadhi- Atura Bala. Since many permutation and combination might occur in between the Bala of Vyadhi and Atura, the selection of Kalpana also varies. Use of Panchavidha Kashaya Kalpana also depends on the liking or disliking of the Atura. Some might be very happy or comfortable in taking Swarasa while others may not be.

यत: केचित्स्वरसद्विष:, केचित्स्वरसप्रिया इतरकल्पनाद्विष एवमादि।

Cha.Sam.Su.st. 4/7 (Chakrapani commentary)

Use of Kalpana also depends upon the Dravya. As it is said in context of Medhya Rasayana-

तो द्रव्यनियमेन कल्पनानियमं वक्ष्यति रसायने; यथा– "मण्डूकपर्ण्या: खरस: प्रयोज्य:, क्षीरेण यष्टीमधुकस्य चूर्णम्। रसोगुडूच्यास्तुसमूल- पुष्प्या:, कल्क: प्रयोज्य: खलु शंखपुष्प्या:"।।

Cha.Sam.Su.St. 4/7 (Chakrapani commentary)

It is clearly mentioned that Swarasa of Mandookaparni should be used, Yastimadhu works as Medhya Rasayana when used in powder form along with milk, Guduchi (wholeplant) in form of Rasa works as Medhya Rasayana and Kalka of Sankhapushpi is ideal for Rasayana Karma. Based on all these factors it is understood that Panchavidha Kashaya Kalpana can not be prescribed to all in all condition, it should be given with due regard to the strength of the patient and severity of the disease.

Conclusion

Panchavidha kashaya kalpana are the basic and primary dosage form. They cannot be prescribed in all conditions and to be given using Yukti of Vaidya and

assessing Bala of Atura and Vyadhi. All the other secondary dosage form have its own importance; for its therapeutic value, enhancement of properties due to special pharmaceutical techniques, easy palatability as compared to basic dosage forms, increased shelf life and easier dispensing. Based on the requirement, appropriate kalpana can be selected.

Extended Learning

- Justify Primary, secondary and tertiary dosage form under Panchavidha kashaya Kalpana and their Upakalpana
- Assess and discuss modern day development and market trend of the dosage form.
- Determine the advantages and disadvantages of the dosage form.
- Critically evaluate rationality behind different proportion ofwater used in various formulations

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SPECIMEN

MODEL QUESTIONS

Long Answers

- Write the Definition, Method of preparation, principle involved, instruments used in small and large scale production, Dose, Anupana and modern aspects of Swarasa in details.
- Why are the Panchavidha Kashaya Kalpana states in a specific order? Describe Kalka Kalpana in detail.
- Why are Panchavidha kashaya Kalpana called the basic kalpana? Describe Hima and Phanta kalpana.
- Describe the Upakalpana of Kwatha with examples.
- Describe Arka kalpana with the instruments, uses, principle involved in it and modern aspects.

Short Answers

- Explain Ksheerapaka kalpana with the principle and importance along with two examples.
- Describe Mantha Kalpana & Pramthya kalpana in detail with example.
- Write about Upakalpanas of Hima.
- Explain Putapaka Swarasa method with principle and suitable example.
- Differentiate : Kalka and Churna
- Describe Aushadha siddha paniya with example.
- Describe Laksha rasa.
- Describe Mamsa rasa.
- Difference between Swarasa and Putapaka swarasa.
- Write the importance of particle size in the preparation of Churna kalpana.
- Enumerate the list of Machineries required for the preparation of Churna and explain their principle and application.

CHAPTER 7

KALPANA NIRMANA – II (METHOD OF PREPARATION OF DIFFERENT DOSAGE FORMS & DIETARY SUPPLEMENTS)

PAPER 1

Contents

Avaleha: Definition, reference, essential ingredients, general method of preparation, siddhi lakshana, shelf life with examples i.e Vasavaleha, Kushmanda avaleha, research, updates on Avaleha Kalpana.

Sneha Kalpana: Advantages of Sneha Kalpana, definition, reference, essential ingredients, general method of preparation, specific rules of sneha preparation, gritha murchana, taila murchana, sneha siddhi lakshana, types of snehapaka, Patra (Gandha Paka), time duration to cook sneha, preparation, shef life with examples Phala grita and Ksheera bala Bala Taila, Concept of Avartana, Liposomes, Research updates on snehakalpana.

Sandhana Kalpana: Introduction, significance of sandhana kalpana, classification, difference between Madhya and Shukta Kalpana, general method of preparation, essential ingredients, anukta Mana, sandhana vidhi, observations, Burnig candle test, Lime water Test, important factors in Asava Arishta Preparation like sandhanan patra selection, place for fermentaion, importance of room temperature, sandhana kala, adding of honey, bhasma, prakshepaka dravya, difference between Asava & Arishta, shelf life and alcohol % with examples Draksharista and Usheerasava, Research updates on Sandhana Kalpana.

Pathya Kalpana: Definition, significance of Pathya, types, general, method of preparation Manda, Peya, Yavagu, Vilepi, Anna or Odana Kalpana, Krashara, Yusha, Takra, Khada, Kambalika, Raga, Shadava, Related Research updates.

Learning Outcome

At the end of this chapter, Students can able to

1. Explain the definition, method of preparation and other details of Avaleha Kalpana along with quality control parameters used/involved in the preparation, examples, instruments, used in small and Large scale production, Research updates
2. Explain the definition, method of preparation and other details of Sneha Kalpana along with quality control parameters used/involved in the preparation, examples, instruments, used in small and Large scale production, Liposomes, Research updates
3. Describe the Significance of sandhana kalpana, classification, Difference between Madya and Shukta Kalpana, general method of preparation, essential ingredients, Anukta Mana, Sandhana Vidhi, observations, Burnig candle test, Lime water Test, difference between Asava and Arishta, Research updates
4. Explain Definition, significance of Pathya, types, general, method of preparation Manda, Peya, Yavagu, Vilepi, Anna or Odana Kalpana, Krushara, Yusha, Takra, Khada, Kambalika, Raga, Shadava, Related Research updates, Dietary Supplements and Nutraceuticals

Avaleha Kalpana

Introduction

Avaleha is one of the secondary Preparation, as it is prepared from swarasa or Kashaya along with sweet material, ghrita, Taila, and prakshepaka dravya. Along with Avaleha, there are many other preparations are also explained like Rasakriya, Phanita and Ghana, as the method of preparation is same as Avaleha. This preparation is more palatable and even the Kids can also consume it easily. लिह्यतेअनेनइतिलेह:। (S.K.D). As it is licked to consume, it is called as Confections. It is classified under semisolid dosage form as per modern pharmaceutics.

Definition

क्वाथादीनां पुन: पाकाद् घनत्वं सा रसक्रिया। सोऽवलेहश्च लेह: स्यात्तन्मात्रा स्यात्पलोन्मिता।। (Sha.Sa., Ma.Kha, 8/1)

Kwatha, Swarasa, Hima or Phanta is boiled up to thicker consistency and by the addition of other ingredients like madhura dravya, Sneha dravya and prakshepaka dravya converting to almost solid consistency is called Avaleha.

Boiling the liquids like kwatha etc. till it attains solid consistancy is called Rasakriya

According to Dalhana, Commentator of Sushruta Samhita

रसक्रियाफाणिताकृति:, 'काकवी' इतिलोके। रसक्रियाकल्पनाचेयम्।
द्रव्योपेक्षयाऽष्टगुणंषोडशगुणंजलंदत्त्वाऽष्टभागावशेष: षोडशभागावशेषोवाक्वाथ: कार्य:।
तत: पूतंकषायंपुनस्तावत्पचेद्यावत्फाणिताकृति:। (Su. Sam. Su. St. 36/20 Dalhana)

Rasakriya looks like Phanita and is also called Kakavi. It is prepared by boiling 1 part of the coarse powder of the drug with 8 parts or 16 parts of water and reduce it to $\frac{1}{8}^{th}$ or $\frac{1}{16}^{th}$ part. Filter the Kashaya and again boil it until the consistency of Phanita i.e. Semisolid.

Synonyms

Avaleha, Rasakriya, Leha

By observing Dalhana's commentary and the definition by Sharangadhara, Phanita, Avaleha and Rasakriya are different dosage forms prepared in the same method.

Phanita- Semisolid with little bit more water consistency

Avaleha- Semisolid, thicker than Phanitha

Rasakriya- Thicker than Avaleha and can be rolled in to vati (Ghanavati).

General Method of Avaleha Preparation

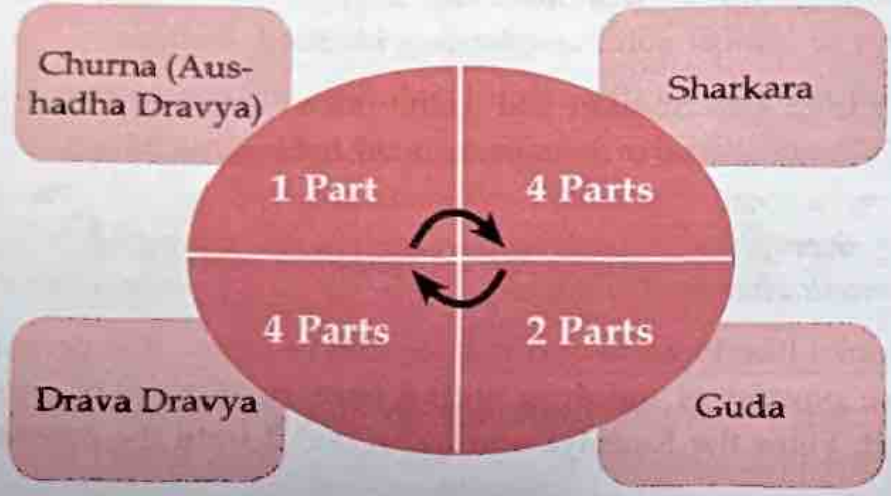
Essential Components of Avaleha

1	Drava Dravya [Liquid Substance]	Swarasa, Kwatha, Hima and Phanta
2	Madhura Dravya [Sweet Substance]	Sita, Sharkara, Guda etc.
3	Kalka Dravya	Pulp of drugs
4	Praksepaka dravyas	Sookshma choorna of Aushadha dravya
5	Snehadravya (Lipid medium)	Ghrita, Taila
6	Additives	Madhu, Lavana, Kshara, Bhasmas

Anuktamana

सिता चतुर्गुणा कार्या चूर्णाच्च द्विगुणो गुडः। द्रवं चतुर्गुणं दद्यात् इति सर्वत्र निश्चयः॥ (Sha.Sa.Ma.Kha.8/2)

If the quantity of ingredients are not specified in the Avaleha preparation, then the below mentioned proportions should be taken:



Method of Preparation

- Drava dravya like Swarasa, Kwatha, Hima or Phanta has to be prepared as per the classical reference.
- Madhura dravya like sita, sharkara or guda has to be dissolved in drava dravya, filtered through clean cloth and subjected to heat over moderate fire till it attains 1-2 thread consistency.
- The fried paste of the drug is added to the Syrup and mixed thoroughly until it forms a homogenous mass.
- Sneha dravya like Ghrita (Taila if it is mentioned in the reference) is added and mixed thoroughly.
- After attaining the Avaleha siddha lakshana, vessel is taken out from the fire.
- Mixture of the fine powders of Prakshepaka Dravya is added and mixed thoroughly.

CHAPTER SEVEN
SPECIMEN

- Madhu should be added after the avaleha becomes cool and packed in air tight wide mouthed containers and preserved.

Avaleha Siddha Lakshana

तुपक्वे तन्तुमत्त्वं स्यादवलेहोऽप्सु मज्जति। स्थिरत्वं पीडिते मुद्रागन्धवर्णरसोद्भवः॥ (Sha.Sam,Ma.Kha, 8/3)

लेहस्यतन्तुमत्ताऽप्सुमज्जनंसरणंनच। अङ्गुल्यापीडितेमुद्रागन्धवर्णरसोद्भवः॥

(Dra.Vi. Uttardhikara by Yadavji 61)

1. Tantumatwam- When a small quantity of avaleha is taken and pulled from both hands, it should break like thread-like appearance.
2. Apsu majjati- If a small quantity of Avaleha is put into water, it should sink and settle at the bottom of the vessel without spreading.
3. Kharatwam- A small quantity of Avaleha is rubbed between thumb and index finger we can experience the roughness may be because of the prakshepaka dravya and the fibers of the ingredients.
4. Peedite mudra- When a small quantity of Avaleha is rubbed between the fingers, there will be the appearance of finger prints on it.
5. Avaleha should have the odour, color, and taste of the ingredients used.

Paka Kaleene (During the time of Paka)	Paka Anantara (After Paka)
• The Paka material sticks strongly to the spoon while stirring or when pressed between fingers, it attains few thread like consistency. • It settles down in the bowl of water without spreading. • It remains very soft and sticky to touch	• Finger prints are imparted over the Paka material. • Soft to touch • Can easily rolled between fingers • Desired colour, odour, and taste of the ingredients are obtained

Note:

- The two or three thread consistencies recommended for Avaleha indicates the presence of 65% to 70% of sugar in the final product. This amount of sugar is sufficient to act as a preservative. Also that consistency will provide proper base for binding of the ingredients.
- Sugar [Mono or disaccharides] chemically binds with water, thus making it unavailable to micro-organism. Through this mechanism, it increases the shelf-life of drugs.
- Gandha (odour), Varna (color), Rasa (taste) etc. of the drug in final product indicates the proper extraction of drugs in the final product.

Instruments, Used in Small and Large Scale Production

Small Scale Production

Gas stove, Electric heaters, Hot plate, Dish pan, Stirrers

Large Scale Production

Steam Jacket vessels with temperature control and Mechanised ladles

Dose

सोऽवलेहश्च लेहः स्यात्तन्मात्रा स्यात्पलोन्मिता।। (Sha.Sam, Ma.Kha, 8/1)

The dosage of Avaleha is 1 pala

Anupana

दुग्धमिक्षुरसो यूषः पञ्चमूलीकषायजम्। वासाक्वाथो यथायोग्यमनुपानं प्रशस्यताते।। (Sha.Sam, Ma.Kha, 8/4)

According to Sarangadhara Samhita, Ksheera, Ikshurasa, Yusha, Laghu panchamoola Kashaya and Vasa kwatha can be used as Anupana.

दुग्धं यूषं कषायश्च जलं फलरसस्तथा। लेहानामनुपानार्थं यथा व्याधि प्रशस्यते।।

(Dra.Vi. Uttardhikara by Yadavji 45)

According to Yadavji, Ksheera, Yusha, Oushadha siddha Kashaya, Jala, and Phalarasa can be used as Anupana.

Time of Administration

ऊर्ध्वजत्रुजरोगघ्नी सायं स्यादवलेहिका। अधोरोगहरी या तु सा पूर्वं भोजनान्मता।। (B. R. Jwarachikitsa. 131)

In Urdhwa jatrugata(above the clavicle) vikaras, Avaleha has to be administered in the evening. In adhobhaga shareera rogas it has to be administered before food.

Shelf Life

हीनत्वं गुटिकालेहौ लभेते वत्सरात्परम्। (Sha.Sam, Pra.Kha, 1/52)

Shelf life of Avaleha is 1 year

As per revised guidelines- 3 years

Importance of Avaleha Kalpana

- It has good shelf-life period as compared to Kwatha, Swarasa.
- It has good palatability due to its sweetness
- As they are carbohydrate in nature, they provide instant energy.
- These preparations are Balya and Rasayana

Quality Control Parameters For Avaleha

1. Colour
2. Odour

3. Taste
4. Consistency
5. Loss on drying at 105°C/Moisture content
6. Total ash
7. Acid insoluble ash
8. Alcohol soluble extractive
9. Water soluble extractive
10. pH (10% aqueous extract)
11. Total acidity
12. Specific gravity at 25°C
13. Total solid content
14. Fat content
15. Reducing sugar/Non-reducing sugar
16. Total sugars
17. Assay for major ingredients/Major constituents of main ingredients.
18. TLC/HPTLC/HPLC/LC-MS (any one or all)
19. Test for heavy/toxic metals- Lead, Cadmium, Mercury, Arsenic
20. Pesticide residue- Organo chlorine pesticides, organophosphorus pesticides, pyrethroids
21. Microbial contamination- Total viable aerobic count, Enterobacteriaceae, Total fungal count (Limits as per ASU Pharmacopoeia)
22. Test for specific pathogen- Escherichia coli, Salmonella spp., Staphyloccocus aureus, Pseudomonas aeruginosa (Limits as per ASU Pharmacopoeia)
23. Aflatoxins (Limits as per ASU Pharmacopoeia) (B1, B2, G1, G2)
24. Shelf life

Examples

1. Vasavaleha, 2. Kushmandavaleha,

1. Vasavaleha

वासकस्य रसप्रस्थं मानिका सितशर्करा। पिप्पल्या द्विपलं तावत्सर्पिषश्च शनैः पचेत्।।
तस्मिल्लेहत्वमायाते शीते क्षौद्रपलाष्टकम्। दत्वाऽवतारयेद् वैद्यो लीडो लेहोऽयमुत्तमः।
हन्त्येव राजयक्ष्माणं कासं श्वासञ्च दारुणम्। पार्श्वशूलञ्च हृच्छूलं रक्तपित्तं ज्वरं तथा।। (B.P.Ma.Kha. 11/ 55-57)

Ingredients

S.No.	Ingredient	Quantity
1	Vasa Swarasa (Vasa)	1 Prashta (768 g)
2	Sita	1 Manika (384 g)
3	Sarpi (Goghrita)	2 pala (96 g)
4	Pippali	2 pala (96 g)
5	Madhu	8 Pala (384g)

Preparation Method

- Swarasa is extracted from the leaves of Vasa by Putapaka method or by Swedana method.
- Sita is added to swarasa and subjected to heat, the mixture is filtered through clean cloth after complete dissolving.
- Again, the mixture is placed over moderate heat to get tantu paka.
  Pippali choorna and Ghrita are added to it and mixed well.
- After self-cooling Madhu is added and stored in a clean wide mouth container.

Dose: 1 pala (48 gms or dose based on Roga and Rogi bala

Anupana: Ksheera, Jala

Indication: Rajayayakshma, Kasa, Swasa, Parshwa shoola, Hrit shoola, Raktapitta, Jwara

2. Kushmandavaleha

निष्कुलीकृत्य कूष्माण्डखण्डात्पलशतं पचेत्।। निक्षिप्य द्वितुलं नीरमर्धशिष्टं च गृह्यते।
तानि कूष्माण्डखण्डानि पीडयेद् दृढवाससा।। आतपे शोषयेत्किञ्चिच्चूलाग्रैर्बहुशो व्यधेत्।
क्षिप्त्वा ताम्रकटाहे च दद्यादष्टपलं घृतम्।। तेन किञ्चिद्भर्जयित्वा पूर्वोक्तं तज्जलं क्षिपेत्।
खण्डात्पलशतं दत्त्वा सर्वमेकत्र पाचयेत्। सुपक्वे पिप्पली शुण्ठी जीरकं द्विपलं पृथक्।
पृथक्पलार्द्धं धान्याकं पत्रैला मरिचं त्वचम्।। चूर्णीकृत्य क्षिपेत्तत्र घृतार्धं क्षौद्रमावहेत्।
छर्दिदेदग्निबलं दृष्ट्वा रक्तपित्ती क्षयी ज्वरी। शोषतृष्णाश्रमच्छर्दिश्वासकासक्षतातुरः।
कूष्माण्डकावलेहोऽयं बालवृद्धेषु युज्यते। उरःसन्धानकृद् वृष्यो बृंहणो बलकृन्मतः।। (Sha.Sam, Ma.Kha,8/22-28)

Ingredients

S.No.	Ingredient	Quantity
1	Nishkulikritya Kushmanda (Pulp without seeds and skin)	100 pala (4.8 kg)
2	Jala (Water for boiling)	200 Pala (9.6 liter)
3	Ghrita	8 pala (384 g)

4	Sita (Sugar Candy)	100 pala (4.8 kg)
5	Pippali Choorna	2 pala (96 g)
6	Shunthi Choorna	2pala (96 g)
7	Jiraka choorna	2pala (96 g)
8	Dhanyaka Choorna	½ pala (24 g)
9	Patra choorna	½ pala (24 g)
10	Ela choorna	½ pala (24 g)
11	Maricha Choorna	½ pala (24 g)
12	Twak choorna	½ pala (24 g)
13	Madhu	4 pala (192 g)

Preparation Method

- The pulp of Kushmanda without seeds and skin is cut in to small pieces and add the double quantity of water to it.
- Boil this over moderate fire until the water reduces to half.
- Filter it through a clean cloth and keep the water aside.
- Baked pulp is taken in a clean cloth and squeezed thoroughly so that all the water content drained out. This water is also added to previous filtrate.
- Baked pulp of Kushmanda and Ghrita (4 pala) are taken in a pan and subjected to frying until pulp turns to golden brown color.
- Mean while add Sita to the filtrate and keep it for boiling to prepare the paka.
- When the paka attains 2 thread consistency add the fried pulp and the remainig quantity of Ghrita and stir thoroughly.
- When Avaleha siddha lakshana appears, stop heating and add the mixture of prakshepaka dravya.
- After cooling add Madhu and mix thoroughly and preserve in an air tight wide mouth container.

Dose: 1 pala or based on agnibala.

Anupana: Ksheera or any liquid as per the disease

Indication: Raktapitta, Kshaya, Jwara, Shosha, Trishna, Bhrama, Moorcha, Swasa, Kasa and Urah kshataha

Modern Concept

Avaleha forms can be compared with confection or electuaries of B.P. Confection form means a way of administering relatively large quantities of insoluble powders in

a palatable guise by making them into paste with sugar syrup and honey. Confections are defined as a very old form of administrating medicine but only a few are in active demand. They are in the form of soft paste and compounded with a sweet or mucilaginous liquid, so as to make them pleasant to taste. Similar form of administrating medicaments is conserves or jam and electuaries. Confections are prepared by both methods

1) By heating with sugar solution
2) By mixing with honey or sugar solution.

Research Updates

1. Sagar Mahendrabhai Bhinde et al, **Pharmaceutical evaluation of modified *Kantakari Avalcha* for pediatric use**, Journal of Drug Research in Ayurvedic Sciences, Volume 8, issue 3, Page 262-270, 2023

   The first batch of Kantakari Avalehya was prepared as per the classical proportion (CKA). The second batch was prepared with an increase in honey (2 times) in the proportion (Intermediate Kantakari Avaleha). And final modified Kantakari Avaleha was prepared with an increase in honey (2 times) and sugar (1.5 times) to achieve the desired taste.

   By this, concluded that Modified Kantakari Avalehawas found to be palatable for pediatric use. The pharmacognostical and physico-chemical evaluation of modified Kantakari Avaleha revealed that it meets almost all the pharmacopeial parameters (except sugar content) and hence data of this study could be used as a reference for this specific modified Kantakari Avaleha. Modified Kantakari Avaleha was found to have almost similar microbial stability to that of the classical one. A clinical study will be needed to determine whether the change in the proportion of sugar and honey has a favorable or negative impact on the clinical outcome.

2. Vyas Suyog D. et. al, **A Systemic Review of Clinical Trials on Avaleha Dosage Form, Registered in Ctri.** International Journal of Pharmaceutical Research and Applications Volume 6, Issue 1 Jan-Feb 2021, pp: 232-239

   There are 55 different avaleha are used which are mentioned in classical Ayurveda text. However, some drugs are very effective in different health conditions as they are repeatedly used as an intervention. These are Drakshadi leha, Chitrak Haritaki, Vasa leha Manibhadra leha, Shirishavaleha, Kantakari leha, and others.

Sneha Kalpana

Introduction

The Nomenclature 'Sneha Kalpana' consists of two words Sneha and Kalpana. Here Sneha refers to Fatty materials like Ghrita, Taila, Vasa, and Majja. Kalpana refers to the

pharmaceutical process of fatty material. Hence Sneha Kalpana means the pharmaceutical process of Sneha dravyas especially Ghrita and Taila. For most therapeutic purposes, Ghrita and Taila are used rather than Vasa and Majja. Among these four Sneha dravyas Ghrita is considered the best. As Ghrita has a special property called 'Samskarasya Anuvarthanath' means without losing its properties it acquires the properties of other substances which are processed with Ghrita.

The literal meaning of Sneha is friendship, when it comes to Ayurveda Sneha always refers to Ghrita and Taila, as these two are widely used for the therapeutics than Vasa and Majja.

Definition of Sneha

स्नेहनंस्नेहविश्यन्दमार्दवंक्लेदकारकम्। (Cha Sam, Su St 13)

The substances which produces Sneha (Snighata), Mardhavata (Softness) increases Kledata (Moistness) in the body is called Sneha.

Sneha Dravya Guna

गुरूशीतसरस्निग्धमन्दसूक्ष्ममृदुद्रवम्। औषधं स्नेहनं प्रायो विपरीत विरुक्षणम् ।।३।। (A. Sam, Su. St 25/3)

Guru, Sheeta, Sara, Snigdha, Sukshma, Mridu and Drava are the general gunas of Sneha.

Advantages of Sneha Kalpana

- Fat soluble active Principles are transferred to Sneha dravya from Plant and mineral materials.
- Added effect of Sneha dravya and Plant and mineral products in a single dosage form.
- To enhance the Shelf life of the Medicine.
- When used externally, absorption will be hastened and enhanced.

Sneha Yoni

There are two Sneha yoni mentioned in the Classics- Sthavara and Jangama

1. Sthavara: Tila, Priyala, Eranda, Sarshapa, Vibhitaki,
2. Jangama: Quadruped animals, Birds and fish

Chaturvidha Snehas

सर्पिस्तैलं वसा मज्जा सर्वस्नेहोत्तमामताः। एषु चैवोत्तमं सर्पिः संस्कारस्यानुवर्तनात्।। (Cha.Sam.Su.St. 13/13)

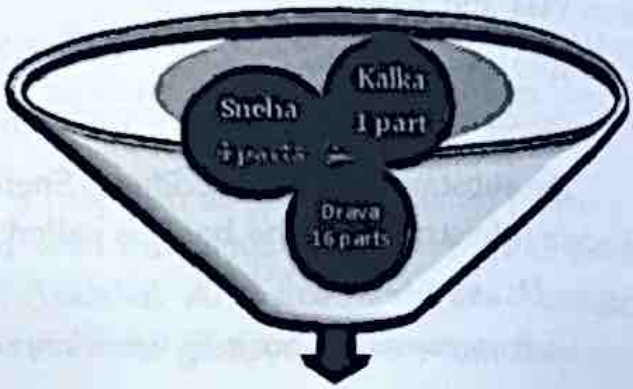
Sarpi (Go Ghrita), Tila Taila, Vasa and Majja are considered as the best among all the Sneha Dravyas. Sarpi is considered as the best among these four Sneha dravyas as Ghrita is having a special property called 'Samskarasyaanuvarthanat'. Means Ghrita can aquire the qualities of other substances which are processed with ghrita without leaving its own qualities.

Here Ghrita is always refers to Goghrita (cow's Ghee), from the class mammalia of the animal kingdom. *Bos indicus and (B) Bos gaurus are the batonical name of Indian cow.* Apart from Indian cow, Ghrita can also be obtained from She-buffalo, goat, sheep, She -camel and mare. Even though the Ghrita of these mammals possess the same qualities but Cow's Ghee is considered as best and is choice for both food and Medicine preparation. As per Anukta paribhasha Ghrita always implies Goghrita only.

General Method of Preparation

कल्काच्चतुर्गुणीकृत्य घृतं वा तैलमेव वा। चतुर्गुणे द्रवे साध्यं तस्य मात्रा पलोन्मिता।। (Sha.Sam.Ma.Kha. 9/1)

Snehapaka definitions are present in almost all the classical text books without much differences. As per the general rule, Snehapaka is prepared by adding 1 part of Kalka, 4 parts of Sneha Dravya (Ghrita or taila) and 16 parts of drava daravya and subjecting to heat untill the appearance of Sneha siddha lakshana.



Sneha paka

Sneha Murchana

Murchana is the process done to Ghrita and Taila before the actual Sneha Paka to remove durgandhatwa (Bad odour) and Amatwa (Raw state). Apart from these, it enhances the therapeutic property when processed for Sneha paka. This process ensures the absorption of active therapeutic principles of the ingredients. The process is similar to the actual Sneha Paka but with different drugs. Sneha Murchana procedure was first explained in Bhaishajya Ratnavali in the Jwarachikitsa Chapter.

Taila Murchana

तैलं कृत्वा कटाहे दृढतरविमले मन्दमन्दानलैस्तत्तैलं निष्फेनभावं गतमिह च यदा शैत्यभावं समेत्य।
मञ्जिष्ठा रात्रिलोध्रैर्जलधरनलिकैः सामलैः साक्षपथ्यैः सूचीपुष्पांङ्घ्रिनीरैः उपहितकथितैर्गन्धयोगं जहाति।।
तैलस्येन्दुकलांशिकैकविकसा भागोऽपि मूर्च्छाविधौ ये चान्ये त्रिफलापयोदरजनीह्रीबेरलोध्रान्विताः।
सूचीपुष्पवटावप्ररोहनलिकास्तस्याश्च पादांशिका दुर्गन्धं विनिहन्ति तैलमरुणं सौरभ्यमाकुर्वते।।

(B. R. Jwaradhikara 1287)

Ingredients

Kalka Dravyas	:	Manjista, Haridra, Lodra, Nagara, Musta, Nalika, Amalaki, Vibhitaki, Keataki pushpa, Vata praroha, Hribera each ¼ part of Manjista,
Sneha Dravyas	:	Tila taila-1 Part
Dravadravya	:	Jala 4 parts of Sneha

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Procedure : Taila is taken in a wide mouthed vessel and subjected to heat over mandagni until the disappearance of froth. Later jala and Kalka is added to Taila and heated over mandagni till the snehasiddha laxana appears. Then Taila is filtered and stored to use it for Sneha Paka.

Ghrita Murchana

पथ्यामात्रीविभीतैर्जलधररजनीमातुलुङ्गद्रवैश्च सर्वैरेतैः सुपिष्टैः पलकपरिमितैर्मन्दमन्दानलेन।
आज्यप्रस्थं विपक्वं परिचपलगतं मूर्च्छयेद्वैद्यराजस्तस्मात् आमोपदोषं हरति च सहसा वीर्यवान्सौख्यदायि।।

(B.R Jwaradhikara, 1285)

Ingredients:

Kalka dravya : Pathya, Amalaki, Vibhitaki, Musta, Haridra, -each 1 pala and matulunga Swarasa Q.S. to prepare Kalka

Sneha dravya : Ghrita- 1 Prastha

Drava dravya : Jala 4 Prasrha.

Procedure : Ghrita is taken in a wide-mouthed vessel and heated over mild fire, till the froth disappears. Then the Kalka and Dravadvravya is added to Sneha and again heated till the appearance of Sneha siddha laxana. Ghrita is filtered and preserved for Sneha Paka.

Katu Taila Murchana

वयस्थारजनीमुस्तबिल्वदाडिमकेशरैः। कृष्णाजीरकह्रीबेरनलिकैः सविभीतकैः।।
एतैः समांशैःप्रस्थे च कर्षमात्रं प्रयोजयेत्। अरुणाद्विपलं तत्र तोयाढकसम्मितम्।
कटुतैलं पचेत्तेन चामदोषहरंपरम्। (B. R Jwaradhikara 288-289)

Ingredients

Kalkadravya : Haritaki, Haridra, Musta, Bilwa Phala, Dadima Bija, Nagakesara, Krishna Jeeraka, Hribera, Nalika, Vibhitaki, Manjista -each 1 Karsha

Sneha Dravya : Katu Taila- 1 Prastha

Dravadravya : Jala 4 Prasrha.

Procedure : Katu Taila is taken in a wide mouthed vessel and heated over mild fire till the froth disappears. Then the kalka and Dravadravya is added to Sneha and again heated till the appearance Sneha siddha laxana. Then Katu taila should be filtered and preserved for Sneha paka.

Eranda Taila Murchana

विकसा मुस्तकं धान्यं त्रिफला वैजयन्तिका। हीबेरवनखर्जूरवटशुङ्गा निशायुगम्।।
नलिका भेव्जं देयं केतकी च समं समम्। प्रस्थेदयं शाणमितं मूर्च्छने दधिकाञ्जिकम्।। (B. R Jwaradhikara)

Ingredients

Kalkadravya	:	Manjista, Haritaki, Kharjura, Nalika, Kanji, Musta, Vibhitaki Vata praroha, Shunthi, Dhanyaka, Arani, Haridra, Ketaki Pushpa, Amalaki, Hribera, Daruharidra and Dadhi each 1 Shana
Sneha Dravya	:	Eranda Taila- 1 Prastha
Dravadravya	:	Jala 4 Prasrha.
Procedure	:	Eranda Taila is taken in a wide mouthed vessel and heated over mild fire till the froth disappears. Then the kalka and Dravadravya is added to Sneha and again heated upto the appearance of Sneha siddha laxana. Then eranda taila is filtered and preserved for Sneha paka.

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Specific Rules of Sneha Preparation

Before proceeding for the Sneha Paka Some general considerations should be followed.

1. **Preparation of Sneha Kashaya**

निक्षिप्य क्वाथयेत्तोयं क्वाथ्यद्रव्याच्चतुर्गुणम्। पादशिष्टं गृहीत्वा च स्नेहं तेनैव साधयेत्।। (Sha.Sam.M.Kha 9/2)

For the purpose of Sneha paka, Kashaya has to be prepared with 1 part of the Drug and 4 Parts of water boiled to reduce it to ¼ part.

2.A. **Quantity of Kalka**

As per the general rule of the Sneha paka, Kalka should be ¼ of the Sneha. There are differences of opinion regarding the quantity of Kalka.

अम्बुक्वाथरसैर्यत्र पृथक्स्नेहस्य साधनम्। कल्कस्यांशं तत्र दद्याच्चतुर्थं षष्ठमष्टमम।।
दुग्धे दध्नि रसे तक्रे कल्को देयोऽष्टमांशकः कल्कस्य सम्यक्पाकार्थं तोयमत्र चतुर्गुणम्।।

(Sha.Sam.M.Kha 9/6-7)

S.No.	Dravadravya in Snehapaka	Quantity of Kalka
1	Jala	$\frac{1}{4}^{th}$
2	Kwatha	$\frac{1}{6}^{th}$
3	Swarasa, Dugdha, Dadhi, Mamsa Rasa, Takra	$\frac{1}{8}^{th}$

If Sneha paka is prepared by using dravadravya as Dugdha, Dadhi, Mamsa Rasa,

and Takra, Kalka should be 1/8th of Sneha and Jala should be 4 times of Sneha for the proper Sneha paka.

8. Pushpa Kalka

पुष्पकल्कस्तु यः स्नेहस्तत्र तोयं चतुर्गुणम्। स्नेहेस्ने स्नेहाष्टमांशश्च पुष्पकल्कः प्रयुज्यो।। (Sha. Sam. M.Kha 9//12)

If Snehapaka has to be prepared with Pushpa kalka, then kalka should be 1/8th part of Sneha and Jala should be 4 times of Sneha.

3. Quantity of Liquids in Snehapaka

In general, dravadravya should be four times of Sneha dravya. This is applicable only when one liquid is used in the preparation. Some specific rules for the quantity of drava dravya are also described.

द्रवाणि यत्रस्नेहेषु पञ्चादीनि भवन्ति हि। तत्र स्नेहसमान्याहुर्यथापूर्व चतुर्गुणम्।। (Sha.Sam.M.Kha. 1/8)

When there is a reference of up to four drava dravyas, then each liquid should be taken four times of Sneha Dravya. When there is a reference of five or more than five drava dravya, then each liquid should be taken equal to Sneha dravya.

क्वाथ्याच्चुर्गुणंवारिपादस्थंस्याच्चतुर्गुणम। स्नेहात्स्नेहसमंक्षीरंकल्कश्चस्नेहपादिकः।। (Chakrapani)

When Kwatha and Ksheera are used in a formulation, Kwatha should be four times of Sneha and ksheera should be equal to Sneha dravyas

Duration of Snehapaka

घृततैलगुडादींश्च साधयेन्नैकवासरे।। प्रकुर्वन्त्युषिता ह्येते विशेषाद् गुणसञ्चयम्। (Sha. Sam. M.Kha 9/19)

Ghrita, Taila and Guda paka dosage forms should not be completed in one day. That means these preparations should be extended up to two days. Here as long as the liquids and kalka are in contact with Sneha, therapeutic properties will be transferred more to Sneha.

क्षीरे द्विरात्रं स्वरसे त्रिरात्रं तक्रारनालादिषु पंचरात्रम्। स्नेहं पचेद्वैद्यवरः प्रयत्नादित्याहुरेके भिषजः प्रवीणाः।
(Vai. Pa Pra)

If Snehapaka is preparing with ksheera, it should be completed within 2 days, If it is done with Swarasa, then it should be completed in three days, If snehapaka is done with takra or Aranala etc., Amla rasa drava dravys, then it should be completed within five days. Sneha paka if done with Moola & valli, then it should be completed within 12 days and if Snehapaka is done with vrihi or mansa rasa, it should be completed within a day.

घृततैलगुडादींस्तुनैकाहादवतारयेत्। व्युषितास्तुप्रकुवन्तिविशेषेणगुणान्यतः।।
क्षीरेद्विरात्रंस्वरसेत्रिरात्रंतक्रारनालादिषुपञ्चरात्रम्। स्नेहेपचेद्वैद्यवरः प्रयत्नादित्याहुरेकेभिषजः प्रवीणाः।
द्वादशाहन्तुमूलानांवल्लीनांक्रममेवच। प्रयत्नादित्याहुरेकेभिषजः प्रवीणाः।
क्रममेव च एकाहंव्रीहिमांसानांपाकंकुर्यात्विचक्षणः। (Vai. Pa. Pra. Trutiya Khanda/ 27-28)

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S.No.	Dravadravya	Duration (days)
1	Ksheera	2
2	Swarasa	3
3	Takra, aranala	5
4	Moola & Valli	12
5	Vrihi, Mamsa Rasa	1

Snehapaka method when only Oushadha dravyas are mentioned

द्रव्येण केवलेनैव स्नेहपाको भवेद्यदि। तत्राप्युक्तः कल्कः स्याज्जलं चात्र चतुर्गुणम्।। (Sha.Sam.M.Kha 9/9)

In a Snehapaka, if only oushadha dravyas are mentioned, then kalka of these drugs have to be used as in the general method of preparation along with four parts of water as drava dravya.

Snehapaka method when only Kwatha dravyas are mentioned

क्वाथेन केवलेनैव पाको यत्रेरितः क्वचित्। क्वाथद्रव्यस्य कल्कोऽपि तत्र स्नेहे प्रयुज्यते।। (Sha.Sam.M.Kha 9/10)

In a Snehapaka, if only Kwatha dravyas are mentioned, then Kalka has to be prepared with the same drugs mentioned for kwatha and heated along with the Kwatha as per the general method of preparation.

Snehapaka without Kalka

कल्कहीनस्तु यः स्नेहः स साध्यः केवले द्रवे। (Sha. Sam. M.Kha 9/11)

In Snehapaka, if kalka is specifically not mentioned then paka should be done with specified drava dravya without adding kalka

If in particular formulation, sneha quantiy is not mentioned, then one liter of sneha has to be taken and on the basis of sneha quantity, the kalka, drava dravya quantity also to be estimated. In particular sneha formulation if the quantity of contents etc. are clearly mentioned, and the quantity is not according to the basic ratio of kalka, sneha, dravadravya (1:4:16), then one has to collect the contents according to quantity prescribed in the particular sneha formulation.

Snehasiddha Lakshana

वर्तिवत्स्नेहकल्कः स्याद् यदा अङ्गुल्या विमर्दितः। शब्दहीनोऽग्निनिक्षिप्तः स्नेहः सिद्धो भवेत्तदा।।
यदा फेनोद्गमस्तैले फेनशान्तिश्च सर्पिषि। गन्यवर्णरसोत्पत्तिः स्नेहसिद्धि तदा भवेत्।। (Sha.Sam.M.Kha 9/12-13)

1. Kalka attains the shape of Varti (wick) when rolled in between the fingers.
2. Kalka burns without producing any crackling sound when put into fire.
3. There will be Phena (froth) formation in case of Tailapaka and there will be the disappearance of Phena (froth) in case of Ghrita Paka
4. There will be appropriate colour, odor and taste as per the ingredients of Snehapaka.

Types of Snehapaka

स्नेहपाकस्त्रिधा प्रोक्तो मृदुर्मध्यः खरस्तथा।। ईषत्सरसकल्क स्तुस्नेहपाको मृदुर्भवेत्।
मध्यपाकस्य सिद्धिश्च कल्के नीरसकोमलेः।। ईषत्कठिनकल्कश्च स्नेहपाको भवेत्खरः।
तदूर्ध्वं दग्धपाकः स्याद्दाहकृन्निष्प्रयोजनः।।१६।। (Sha.Sam.M.Kha 9/14-16)

Types of Snehapaka which are meant for therapeutic uses are

1. Mridu paka 2. Madhyama paka 3. Khara paka.

Other two types of Paka also mentioned Amapaka and Dagdapaka which are not preferred for therapeutic purposes.

S.No	Name of the Paka	Lakshana	Test
1	Mridu	Kalka contains small quantity of moisture	1. Produces crackling sound when put it in to fire 2. Kalka sticks to the fingers when it is rubbed and didn't attain wick shape
2	Madhyama	Kalka is devoid of moisture and it is soft	Kalka attains wick shape, smooth and soft
3	Khara	Kalka becomes rough and hard	Kalka will be form rough and hard powder
4	Ama	Kalka is in semisolid state and cannot be taken in between the fingers	Kalka is like Slurry
5	Dagda	Kalka burns in to charred	Smell of burnt material

Therapeutic Indications of Snehapaka

नस्यार्थं स्यान्मृदुः पाको मध्यमः सर्वकर्मसु।। अभ्यङ्गार्थं खरः प्रोक्तो युञ्ज्यादेवं यथोचितम्। (Sha.Sam.M.Kha 9/17)
स्रोऽभ्यङ्गे स्मृतः पाको मृदुर्नस्तः क्रियासु च। मध्यपाकं तु पानार्थं बस्तौ च विनियोजयेत्।। (Cha.Sa. K. St 12/104)

S.No.	Snehapaka	Acc. to Sharangadhara	Acc. To Charaka
1	Mridu	Nasya Karma	Nasya
2	Madhyama	For both external and internal Use- Abhyanga, basti, Nasya, Karnapurana, Gandusha, kavala, Sthanika Basti, Tarpana, Dhara, Pichu,	Panartha, Basti
3	Khara	Abhyanga	Abhyanga

Shelf Life of Snehakalpana

हीनत्वं गुटिकालेहो लभेते वत्सरात्परम्। हीनाः स्युर्घृततैलाद्याश्चतुर्मासाधिकास्तथा।। (Sha.Sam.Pra.Kha 1/52)

Shelf Life

16 months (Sha. Sam), 1 year (Y.R)

3 years (Revised guidelines)

Patrapaka or Gandhapaka

Patrapaka is the process by which the Sneha is flavoured or augmented by certain solution- soluble or miscible substances. The fine powder form of the drugs is placed in the vessel in to which the Sneha is filtered and mixed well when Sneha is in lukewarm state. These drugs are generally taken in the quantity of 1/16 part of the Sneha and all drugs should be taken in equal quantity. To render the taila (oil) fragrant, usually the following substances are used. Ela, Gandhaphiroja, Twak, Usturak (Storax officinalis), Lavanga, Pippalimula, Kesara, Ushira, Tamalapatra, Nakhi (Unguis odoratus), Srigandha, Khattasi (pouch of civet cat), Kumari, Kasturi (preputial dried secretion of musk animal), Jatamansi, Karpuravalli, Sati, Saileya, Musta, Kusta, Kankola, Latakasturi. For four seers of the taila-one tola of the each of the ingredients should be taken, with the exception of Karpura (camphor) which should be four tolas. Karpura, Kasturi, Usturak (Storax), Nakhi should be added at the end after the process of gandhapaka.

In Bhaisajya ratnavali for gandhapaka vidhi of taila specific method is mentioned as follows : Manjista, Nakhi, Kankola, Nalika, Jatikosha, Twak, Kunduruka, Karpura, Turuska, Lavanga, Spukka, Kumkuma, Kasturi, these drugs should be collected in equal quantity seperately and all these are mixed, then this mixture of drugs are taken 1/16thpart of taila. After the preparation of taila, mentioned gandhadravyas are collected in specified quantity and made in to powder form. This powder is placed over clean cloth and made in to pottali (bundle) form by tying with thread. Then this pottali is immersed in taila for ten days. It should be observed that, while placing gandhadravyas, taila should be in lukewarm state. After the ten days process of gandhapaka, pottali is taken out from taila and this taila preserved in glass bottles.

Because of doing gandhapaka process, taila is flavoured or augmented and also its therapeutic efficacy is enhanced. According to different classics this flavouring process of taila can be called as patrapaka or gandhapaka. Most of the times, gandhapaka vidhi is mentioned only for taila kalpana than ghrta kalpana. It might be because of the disagrecable Gandha of tailas and they are extensively used for external application purpose.

Surya Paka (Aditya Paka)

It is a specific paka of Sneha Kalpana mentioned by some of the ancient Ayurvedic Scholars, where taila is heated with mild temperature produced by exposure of sun light for specific time period. This method is very commonly practiced to prepare taila Paka from the drugs which are having volatile property and sensitive in nature. This method is also mentioned in some of the books by the name of Aditya Paka. Idea

behind this particular paka is that, to extract the active principles from the sensitive drugs in controlled low temperature.

E.g.:-

1. Surya Paka, Kasisadi taila - sha. Sam.
2. Kutaja Patra taila etc.

Precautions to be taken during Sneha paka

Before the processing of sneha paka, Sneha should be pure, clear and without slurry and it should be taken only after doing murchana karma. In case of ghrta, preferably old ghee (purana ghrta) should be taken. In case of taila, it should be new one.

Taila (Sneha) Patra should be wide mouthed, because during the heating process, taila may spill out, if it is having narrow mouth. Depending upon the quantity of sneha, the size of the sneha patra should be selected.

During the process of sneha paka, maintain the intensity of fire throughout the operation in order to get desirable grade of temperature. Gentle boiling of sneha is to be maintained continuously. Always sneha paka should be prepared in mrdu and madyamagni only.

Kwatha should not be poured, suddenly in hot taila if it is poured, taila may spill out from the vessel. Hence by stirring it kwatha has to be added slowly.

The mixture is stirred constantly and carefully to ensure that the kalka does not stick to the bottom of the vessel resulting in to carbonisation.

Care should be taken to determine the proper stages of sneha paka. When all the drava dravyas have evaporated, the moisture in the kalka also starts to evaporate. At this stage, it has to be stirred more often and carefully to ensure that the kalka does not stick to the bottom of the vessel. The kalka is taken out from the ladle and tested from time-to-time to know the condition and stage of the paka.

In some particular sneha kalpana, sharkara, if mentioned is added to the final product when it becomes cool.

Sneha if it is required to prepare with gomutra like kshara dravyas, then it has to be prepared with atmost care, because kshara combination with sneha may produce excessive phena (foam), So that the sneha may spill out of the sneha patra during pakavasta.

In the beginning, the boiling of sneha should be on mrdu agni (mild fire) and in the end also it should be only on mild fire. Whenever the saindhava lavana, kshara etc. are mentioned, they should be dissolved in the kashaya, then kalka and sneha should be added.

Where sarjarasa, madhuchishtam (bees was) are mentioned, they should be added only after the filteration of sneha or place in the vessel in which the sneha is to be filtered.

After sneha paka process, in order to obtain optimum quantity of sneha, the kalka should be squeezed (after the paka) when it is still hot.

Gandhapaka dravyas should be added gently with stirring, when the sneha is in lukewarm state.

Dose

The dose of ghrta kalpana will be 4 gm to 6 gm which is used for internal administration, example- Ashoka ghrta, whereas Triphala ghrta which is used for nasya the dose will be 4 bindu. Some of the ghrtas, like jatyadi ghrta used for external application, the dose will be decided by surface area, where it should be applied.

The dose of taila kalpana will be 12 ml example- Mahanarayara taila which is used for internal administration whereas shadabindu taila the dose will be 6 bindus (used as nasal drops), whereas the dose of apamargakshara taila will be 2 drops which has to be instilled in ear. Some of the tailas, like mahamasha taila used for external application, the dose will be decided by surface area, where it should be applied.

.....तस्य मात्रा पलोन्मिता।। (Sha.Sam.M.Kha. 9/1)

The General dose of Sneha kalpana is 1 pala (48 gms)

देया दीप्ताग्नये मात्रा स्नेहस्य पलसम्मिता। मध्यमाय त्रिकर्षा स्याज्जघन्याय द्विकार्षिकी।। (Sha.Sam.U.Kha. 1/7)

The dose of the Sneha depends on the Agni of the patient. In Uttama agni, madhyama agni and Heena agni persons, Sneha has to be administered in 1 pala (48 gms), 3 karsha (36 gms) and 2 karsha (24 gms) respectively.

Method of Administration

Generally, the anupana for internal use when not specified, warm water can be advised. The ghrta has to be made warm and melted before administration. This can be taken with the media of other liquids also as per the indication. It is preferably advised to administer before food.

Preservation

Ghrta can be preserved in glass, polythene or aluminum containers and usually tailas are preserved in glass bottles. Usually glass jars (wide mouthed glass containers) are used for packaging purpose of ghrtas, so that it will be convenient to pick up the solidified ghrta with spoon like instrument. Whereas for taila preservation narrow mouthed glass bottles are used. Sterilized and moisture free containers are to be used for packaging of sneha kalpana.

Instruments, used in Small and Large scale production

Small Scale Production

Gas stove, Electric heaters, Hot plate, Dish pan, Stirrers

Large Scale Production

Steam Jacket vessels with temperature control and Mechanised ladles

Quality Control Parameters For Taila/ Ghrita

1. Colour
2. Odour
3. Rancidity
4. Specific gravity/Weight/ml.
5. pH value
6. Loss on drying at 105°C/Moisture content
7. Congealing point
8. Refractive index
9. Viscosity
10. Iodine value
11. Saponification value
12. Unsaponifiable matter (percentage of)
13. Acid value
14. Peroxide value
15. Free fatty acids (percentage of)
16. Total fatty matter (percentage of)
17. Mineral oil test (it should be negative)
18. GLC/TLC/HPTLC/HPLC/GC-MS (any one of all)
19. Test for heavy/toxic metals- Lead, Cadmium, Mercury, Arsenic
20. Pesticide residue- Organo chlorine pesticides, organophosphorus, pesticides, pyrethroids (Limits as per ASU Pharmacopoeia)
21. Microbial contamination- Total viable aerobic count, Enterobacteriaceae, Total fungal count (Limits as per ASU Pharmacopoeia)
22. Test for specific Pathogen- Escherichia coli, Salmonella spp., Staphyloccocus aureus, Pseudomonasaeruginosa (Limits as per ASU Pharmacopoeia)
23. Aflatoxins, (B1, B2, G1, G2) (Limits as per ASU Pharmacopoeia)
24. Shelf life

Triphala Ghrita

त्रिफलाया रसप्रेस्थं प्रस्थं वासारसोद्भवम्। भृङ्गराजरसप्रस्थं प्रस्थमाजं पयः स्मृतम्।।
दत्त्वा तत्रघृतप्रस्थं कल्कैः कर्षमितैः पृथक्। त्रिफला पिप्पली द्राक्षा चन्दनं सैन्धवं बला।।
काकोली क्षीरकाकोली मेदा मरिचनागरम्। शर्करा पुण्डरीकं च कमलं च पुनर्नवा।।
निशायुग्मं च मधुकं सवैरेभिर्विपाचयेत्। नक्तान्ध्यं नकुलान्ध्यं च कण्डूं पिल्लं तथैव च।।
नेत्रस्रावं च पटलं तिमिरं काचकं जयेत्। अन्येऽपि प्रशमं यान्ति नेत्ररोगाः सुदारुणा।।
त्रैफलंघृतमेतद्धि पाने नस्यादिषूचितम्। (Sha.Sam.M.Kha 9/66-71)

Ingredients

a. Drava dravya: Triphala Kwatha, Vasa Swarasa, Bhringaraja Swarasa Aja ksheera each 1 prastha
b. Sneha dravya: Goghritha 1 prastha
c. Kalka dravya: Haritaki, Bibhitaki, Amalaki, Pippali, Draksha, Chandana, Saindhava, Bala, Kakoli, Ksheera Kakoli, Meda, Maricha, Nagara, Sharkara, Pundarika, Kamala, Punarnava, Haridra, Daruharidra, Yastimadhu each 1 Karsha.

Method of Preparation

In a Snehapatra, prescribed quantity of Murchita Ghrita is taken and heated over mild fire and then dravadravya and kalka are added. The mixture is heated till the Sneha siddha lakshana appears. Triphala Ghrita is filtered when it is hot and preserved in a suitable container.

Note: It can be used for Pana and Nasya, Netra Tarpana

Dose: Pana- 1 pala, Nasya, Tarpana- Q.S

Indication: Naktyandhya, Nakulandhya, Netra kandu, Pilla, Netra srava, Patala, Timira, Kacha.

Brahmi Ghrita

ब्राह्मीरसवचाकुष्ठशंखपुष्पीश्रुतं घृतम्। पुराणं स्यादपस्मारोन्मादग्रहहरं परम्।। (B.P, Apasmara)

Ingredients

a. Kalka dravya: Brahmi, Vacha, Kustha, Shankha Pushpi each 1 part (100g each)
b. Sneha dravya: Murchita Ghrita- 4 parts (1600 g)
c. Drava dravya: Brahmi Swarasa- 16 parts (6400 ml)

Method of Preparation

In a Snehapatra take prescribed quantity of Murchita Ghrita and heat it over mild fire and then add drava dravya and kalka. Heat the mixture till the Sneha siddha lakshana appears. Filter Brahmi Ghrita when it is hot and preserve in a suitable container.

Indication: Apasmara, Unmada, Graha roga

Dose: 10-30 ml

Anupana: Ushnajala

Narayana Taila

अश्वगन्धां बलां बिल्वं पाटलां बृहतीद्वयम्। श्वदंष्ट्राऽतिबला निम्बं स्योनाकं च पुनर्नवा।।
प्रसारिणीमग्निमन्थं कुर्याद्दशपलं पृथक्। चतुर्द्रोणे जले पक्त्वा पादशे यंश्रुतं नयेत्।।
तैलाढकेन संयोज्य शतावर्या रसाढकम्। क्षिपेत्तत्र च गोक्षीरं तैलात्तस्माच्चतुर्गुणम्।।
शानैर्विपाचयेदेभिः कल्कैर्द्विपलिकैः पृथक्। कुष्ठैलाचन्दनं मूर्वा वचामांसी ससैन्धवैः।।
अश्वगन्धाबलारास्नाशतपुष्पेन्द्रदारुभिः। पर्णीचतुष्टयेनैवत गरेण च साधयेत्।।
ततैलं नावनऽभ्यङ्गे पानेबस्तौ च योजयेत्। पक्षाघातं हनुस्तम्भं मन्यास्तम्भं गलग्रहम्।।
खल्लत्वं बधिरत्वं च गतिभङ्गं कटिग्रहम्। गात्रशोषेन्द्रियध्वंसावसृक्शुक्रज्वरक्षयान्।।
अन्त्रवृद्धिं कुरण्डं च दन्तरोगं शिरोग्रहम्। पार्श्वशूलं च पाङ्गुल्यं बुद्धिहानिं च गृध्रसीम्।।
अन्यांश्चविषमान्वाताञ्जयेत्सर्वाङ्गसंश्रयान्। अस्य प्रभावाद्वन्ध्यापि नारी पुत्रं प्रसूयते।।
मर्त्यो गजो वा तुरगस्तैलादस्मात्सुखी भवेत्। यथा नारायणो देवो दुष्टदैत्यविनाशनः।।
तथैव वातरोगाणां नाशनं तैलमुत्तमम्। (Sha.Sam.M.Kha. 9/101-110)

Ingredients

a. **Drava dravya:**

i. **Kwatha dravyas:** 1. Ashwagandha, 2. Balamula, 3. Bilvamula twak, 4. Patalamula twak, 5. Brhatimula, 6. Kantakari, 7. Goksura, 8. Atibala, 9. Nimba twak, 10. Syonaka, 11. Punarnava, 12. Gandhaprasarini and 13. Agnimantha; each 10 pala (480 gms each); Water for decoction-4 drona (48 liter), reduced to 12 liter.

ii. **Shatavari Swarasa:** 1 adaka (3 liter),

iii. **Godugdha:** 2 adaka (6 liter.)

b. **Sneha dravya:** Tilataila- 1adaka (3 liter)

c. **Kalka dravya:** 1. Kustha, 2. Suksma ela, 3. Rakta candana, 4. Murva, 5. Vaca, 6. Jatamamsi, 7. Saindhava lavana, 8. Asvagandha, 9. Bala, 10. Rasna, 11. Satapuspa, 12. Devadaru, 13. Shaliparni, 14. Prusniparni, 15. Mudgaparni, 16. Mashaparni and 17. Tagara; each 2 pala (96 gms).

Method of Preparation

Murchita Tila taila is taken in a wide mouthed vessel and heated over mild fire. Later Kashaya, Swarasa and Kalka are added and heated over mild fire till the Sneha siddha lakshana appears. Put off the fire and Ghrita is filtered when it was mild hot and preserved in a suitable container.

Indication

Pakshaghata, Hanustambha, Manyastambha, Galagraha, Khalli, Badhirya, Gati-bhanga, Katigraha, Gatrasona, Indriya-dhwamsa, Raktagata roga, Shukragata roga,

Jwara, Kshaya, Antravrddhi, Andavrddhi, Dantaroga, Shirograha, Parshwashula, Pangu, Buddhi-hani, Grdhrasi and all other types of severe vataja roga, even in Sarvangagata vata roga, Vandhyatwa.

It is not just indicated in humans even it can be utilized in animals also like Elephants and Horses suffering from vatavyadhis.

Utility

Narayana Taila can be used for Nasya, Abhyanga, Pana and Basti.

Note: As Shatavari is used it is called Narayana Taila and also As Lord Narayana kills the Demons in the same way it also destroys all the Vatavyadhis.

Jatyadi Ghrita

जातीनिम्बपटोलं च द्वेनिशे कटुरोहिणी। मञ्जिष्ठा मधुकं सिक्थं करञ्जोशीरसारिवाः।।
तुत्थं च विपचेत्सम्यक्कर्कैरेभिर्घृतं बुधः। अस्य लेपात् प्ररोहन्ति सूक्ष्मनाडीव्रणा अपि।।
मर्माश्रिताः क्लेदिनश्च गम्भीराः सरुजो व्रणाः। (Sha.Sam.M.Kha, 9/58-60)

Ingredients

a. Kalka dravya: 1. Jati, 2. Nimba Patra, 3. Patola Patra, 4. Daru Haridra, 5. Haridra, 6. Katukarohini, 7. Manjistha, 8. Madhuka, 9. Karanja Patra or bija, 10. Usira, 11. Sariva, 12. Tutha (Sasyaka), 13. Siktha (Madhuchista),

b. Sneha dravya: Murchita Goghrta- 4 Parts.

c. Drava dravya: Water- 16 Parts.

Procedure

Fine powders of Kalka dravyas are taken in a khalwa yantra and mixed thoroughly, added required quantity of water to it to prepare Kalka and later this is added to Sneha patra containing Sneha and drava dravya. It is heated over mild fire till the appearance of Sneha siddha lakshana. Later filtered it and preserved Properly.

Mode of administration: Used for external application only.

Therapeutic Uses

Nadi Vrana, Vrana (marma sthana), Vranas with exudation, Vranas which are very deep and those painful.

Panchaguna Taila

Reference: **Siddha Yoga Samgraha of Yadavji, Vatarogadikara 20/17**

Ingredients

a. Drava dravya: Kashaya- 1. Haritaki, 2. Bibhataki, 3. Amalaki, each 100 g, 4. Nimba Patra, 5. Nirgundi Patra each 300 g., Jala 7200 ml boil to prepare kashaya by reducing it to ¼th.

b. Sneha dravya: Tila Taila- 1600 ml

c. Kalka dravya: 1. Madhucchista, 2. Gandhaphiroja, 3. Rala, 4. Shuddha Guggulu, 5. Shilajatu each 80 g, 6. Karpura- 100 g,

d. Other ingrents: 1. Terpentine oil, 2. Eucalyptus oil and 3. Kejoputi oil each 50ml

Procedure

Prepare padavashesha Kashaya of Triphala, Nimba patra and Nirgundi Patra and to that Kashaya add Murchita Tila taila and molten Madhucchista, Gandhaphiroja, Rala, Guggulu and Shilajatu. Then subject it to Snehapaka preferably Kharapaka. Now add Terpentine oil, Eucalyptus oil and Kejoputi oil, mix it thoroughly. Then filter it and after self-cooling, add Karpura and mix thoroughly and preserve in proper container.

Action: Shoolahara, Shothahara, Vranashodhaka, Vranaropaka

Indication: External application in Sandhi shoola, Sandhi Shotha, Karna Shoola, Dusta vrana.

Ksheerashatphala Ghrita (Pippalyadi Ghrita)

पिप्पलीपिप्पलीमूलचव्यचित्रकनागरैः।। ससैन्धवैश्च पलिकैर्घृतप्रस्थं विपाचयेत्।
क्षीरं चतुर्गुणं दत्त्वा तद् घृतं प्लीहनाशनम्।। विषमाज्वरमन्दाग्निहरं रुचिकरं परम्। (Sha. Sam. M.Kha., 9/19-20)

Ingredients

a. Kalka dravya: 1. Pippali, 2. Pippalimula, 3. Chavya, 4. Chitraka , 5. Nagara and 6. Saindhava lavana each 1 pala

b. Sneha dravya: - Goghrita- 1 Prastha

c. Drava dravya: - Goksheera -4 Prastha, Jala- 4 Prastha.

Method of Preparation

Murchita Ghrita is taken in a wide mouthed vessel and melted it over mild fire. Later godughda and jala are added and heated it until Sneha siddha lakshana appears and preserved in air tight container.

Action: Agni deepaka, Ruchya

Indication: Pliha, Vishama Jwara, Agnimandya

Dose: 1 Pala

Arka Taila

अर्कपत्ररसे पक्वं हरिद्राकल्कसंयुतम्। नाशयेत्सार्षपं तैलं पामां कच्छूं विचर्चिकाम्। (Sha.Sam.M.Kha. 9/147)

Ingredients

a. Kalka dravya: Haridra- 1 part

b. Sneha dravya: Sarshapa Taila- 4 parts

c. Dravva dravya: Arkapatra Swarasa-4 parts, Jala-4 parts.

Method of Preparation

Murchita Sarshapa Taila is taken in Sneha Patra and heated over mild fire. Then Dravadravya and kalka are added to it and heated upto Sneha siddha lakshana appears. Then filtered when it is hot.

Indication: Pama, Kacchu, Vicharchika

Method of use: External application

Jatyadi Taila

जातीनिम्बपटोलानां नक्तमालस्य पल्लवाः। सिक्थं समधुकं कुष्ठं द्वे निशे कटुरोहिणी।
मञ्जिष्ठा पद्मकं लोध्रमभया नीलमुत्पलम्। तुत्थकं सारिवाबीजं नक्तमालस्य दापयेत्।
एतानिसमभागानि पिष्ट्वा तैलं विपाचयेत्। नाडीव्रणे समुत्पन्ने स्फोटके कच्छुरोगिषु।
सद्यः शस्त्रप्रहारेषु दग्धविद्धेषु चैव हि।। नखदन्तक्षते देहे व्रणे दुष्टे प्रशस्यते। (Sha.Sam.M.Kha, 9/168-171)

Ingredients

a. Kalka dravya: 1. Jati patra, 2. Nimba patra, 3. Patola patra, 4. Karanja patra, 5. Madhucchistha, 6. Yastimadhu, 6. Kustha, 7. Haridra, 8. Daruharidra, 9. Katuki, 10. Manjistha, 11. Padmakadtha, 12. Lodhra twak, 13. Haritaki, 14. Nila kamala, 15. Suddha tuttha, 16. Sariva and 17. Karanja bija; each 28 g (total kalka 500 gm)

b. Sneha dravya: Tila taila - 2 liter

c. Drava dravya: Water - 8 liter

Method of Preparation

Murchita Sarshapa Taila is taken in Sneha Patra and heated over mild fire. Then Dravadravya and kalka are added to it heated upto Sneha siddha lakshana appears. Then filtered when it was still hot.

Indication: Nadivrana, Spota, Kacchu, Sadyo vrana Dagdha vrana, Dusta vrana, Vrana due to Nakha and Danta Kshata

Method of use: External application

Phala Ghrita

मञ्जिष्ठाकुष्ठतगरत्रिफलाशर्करावचाः।। द्वे निशे मधुकं मेदां दीप्यकं कटुरोहिणीम्।
पयस्याहिङ्गुकाकोलीवाजिगन्धाशतावरीः। पिष्ट्वाऽक्षांशावृतप्रस्थंपचेत्क्षीरचतुर्गुणम्। (A.Hri., U.Ta. 34/63-65)

Ingredients

a. Kalka dravyas: Manjista, Kustha, Tagara, Haritaki, Bibheetaki, Amalaki, Sariva, Vacha, Haridra, Daruharidra, Madhuka, Yavani, Katuki, Ksheera Vidari, Hingu, Kakoli, Ashwagandha and Shatavari each 1 Aksha (Karsha).

CHAPTER SEVEN

b. Sneha dravya: Goghrita- 1 Prastha.

c. Dravya dravya: Ksheera- 4 Prastha.

Method of Preparation

Murchita Goghrita is taken in Sneha Patra and heated over mild fire. Then Dravadravya and kalka are added to it and continued to heat upto Sneha siddha lakshana appears. Then filtered when it was still hot.

Dose: 1 pala

Anupana: Ushna Jala

Indication: Vatavikara, Shukra vikara, Garbhini roga, Karshya etc.,

Ksheerabala Taila

बलामूलात् पञ्चपलं क्षीरपिष्टञ्च योजयेत्।
क्षीरे चतुर्गुणे तैलप्रस्थं मृद्वग्निना पचेत्।।
एतत्क्षीरबलातैलं वातशीतिविनाशनम्।। (Sa.Yo., Tai. Pra.)

Ingredients

a. Kalka dravya: Balamoola Kalka- 5 pala

b. Sneha dravya: Moorchita Tila Taila- 1 prastha

c. Drava dravya: Ksheera – 4 prastha

Method of Preparation

Murchita Tila Taila is taken in Sneha Patra and heated over mild fire. Then Drava dravya and kalka are added to it and continued to heat upto Sneha siddha lakshana appears. Then filtered when it was still hot. In this preparation Balamoola Kalka has to be prepared by using ksheera.

Dose: For Abhyantara, Basti- 1 pala or as per Roga rogi bala

Bahya: As required

Anupana: Ushna Jala

Indication: All types of Vata vyadhis

Guduchi Ghrita (Amrutha Ghrita)

गुडूचीक्वाथकल्काभ्यांसपयस्कंशृतंघृतम्। हन्तिवातं तथा रक्तंकुष्ठं जयति दुस्तरम्।। (B.R. 27/129)

Ingredients

a. Kalka dravya- Guduchi kalka -1 part

b. Sneha dravya- Go Ghrita -4 parts

c. Drava dravya- Guduchi Kwatha, Goksheera-16 parts each

Method of Preparation

Go Ghrita is taken in Sneha Patra and heated over mild fire. Then Dravadravya and kalka are added to it and continued to heat upto Sneha siddha lakshana appears. Then filtered when it was still hot.

Dose: 1 pala (48 gms)

Anupana: Ushna Jala

Indication: Vatarakta, Kustha

Concept of Avarthana

The literal meaning of Avarthana is "repetition". The concept of Avartana is explained in the context of Sneha Kalpana i.e., Ghrita and Taila Paka. The process of Avarthana is first explained in Chakradatta in the context of Vatarakta Chikitsa.

General Method of Avarthana

As per the reference of Snehapaka, the ingredients like, kalka, sneha and drava dravya are taken and subjected to Sneha paka procedure. After obtaining Sneha siddhi lakshana, sneha has to be filtered and again it is subjected to Sneha paka by adding same kalka and dravadravya. This process can be repeated for 10, 27, 41, 100 and 1000 times.

Observation

After each paka the quantity of Sneha will be reduced and become thicker in consistency.

Different Opinions Regarding Avartana

According to Gayadasa: In Su. Sa. Chi 4, while explaining Sahasrapaka bala taila, First prepare the Sneha as per the general method of Sneha paka and from the second Avarthana only dravadrvya has to be added and repeat the procedure.

According to Jejjata: Add 100 or 1000 times of dravadravya at a time and subject it for Sneha Kalpana so that loss can be minimized.

Indication

Generally, Avarthita Sneha are indicated in Vatavyadhi for Abhyantara prayoga and for Nasya Karma.

Liposome

Etymology

The name liposome is derived from two Greek words: "Lipos" meaning fat and "Soma" meaning body. Liposomes can be formed in variety of sizes as unilamellar or multilamellar construction, and its name relates to its structural building blocks, phospholipids, and not to its size.

Application of Liposome

Liposome is used for drug delivery due to their unique properties. A liposome is capable to deliver hydrophilic and lipophilic substances inside a hydrophobic membrane; dissolved hydrophilic solutes cannot readily pass through the lipids. Hydrophobic chemicals can be dissolved into the membrane, and in this way, liposome can carry both hydrophobic molecules and hydrophilic molecules. To deliver the molecules to sites of action, the lipid bilayer can fuse with other bilayers such as the cell membrane, thus delivering the liposome contents.

By making liposome in a solution of drugs (which would normally be unable to diffuse through the membrane, i.e., hydrophilic drugs), they can be (indiscriminately) delivered past the lipid bilayer. There are three types of liposomes– MLV (multilamellar vesicles), SUV (Small Unilamellar Vesicles), and LUV (Large Unilamellar Vesicles). These are used to deliver different types of drugs.

Liposome as topical drugs

Liposomal encapsulation showed more drug retention compared with plain drug gel and plain drug cream. The higher drug skin retention in case of liposomal gel may be due to creation of reservoir effect for drug in skin due to deposition of other components of liposomes with drug into the skin, thereby increasing the drug retention capacity into the skin.

In a study, the liposomal product of ketoconazole was prepared with the view to improve therapeutic response and reduce the possible adverse symptoms. Here, liposomes of ketoconazole were prepared using thin-film hydration technique. Percentage entrapment efficiency was optimized after studying the effect of various process and formulation variables. And, the liposomal delivery of ketoconazole was found better.

Recently, increasing attention has been focused on Solid Lipid Nanoparticles (SLN), because it offers advantages viz. possibility of controlled drug release and drug targeting, increased drug stability, high drug payload, no biotoxicity of the carriers, avoidance of organic solvents, no problems with respect to large scale production, cost effective, and sterilization. Further more, one study established that the incorporation of hydrophilic lamivudine in SLN carriers results in decreased bone marrow toxicity, increased bio availability, and enhanced antiviral activity. This study claimed that lamivudine in SLN present cross blood brain barrier and action target site.

As per one research work, the cumulative percentage drug release of nimesulide was found to be approximately 60% in 24 hours and release behavior was in accordance with Higuchi-equation. The results indicate that the SLNs area promising controlled-release system. It may also allow a reduction in dosage and a decrease in systemic toxicity.

In nut shell, one may suggest that during the past 30 years, liposomes have received increased attention from the scientific community, as well as from the industry, due to the possibility of being a pharmaceutical carrier for numerous problematic drugs. This success seems to drive the present interest on the field with more than 2,000 papers and reviews per year. We will concentrate in two aspects of the utilization of Liposomes: As carriers either for macromolecules, for the treatment of cancer and inflammatory disorders, or for small molecular weight drugs, for the treatment of intracellular infectious.

In the field of novel drug delivery systems, liposome is one of the advanced dosage forms in which nanoparticles comprising lipid bilayer membranes surrounding an aqueous interior are formed. The amphiphilic molecules used for the preparation of these compounds have similarities with biological membranes and have been used for improving the efficacy and safety of different drugs. In this dosage form, the active compound can be loaded either in the aqueous spaces, if it is water-soluble, or in lipid membrane, if it is lipid soluble.

The fundamentals of *sneha kalpana/paka* of Ayurved and liposomes as advanced drug delivery vehicle have similarity with respect to their origin and character as both are lipoidal in nature. In the preparation of *snehapaka*, the principle is to transfer active constituents of herbs in lipid and water according to its solubility by application of heat.

Sandhana Kalpana (Fermented Preparations)

Introduction

The liquid preparations which are mentioned under 'Panchavidha Kashaya Kalpana' are generally meant for Sadhyo Prayoga. In order to increase the shelf life of these preparations, our Acharyas have invented a new type of preparations which are having long shelf life and therapeutically more potent and are called Asava and Arista. The method of preparation is called as Sandhana Kalpana. In modern Pharmaceutics, this type of preparation is called as "Fermantative Preparations". They have identified as 'self-generated alcohol' in them, which brings many added advantages.

In 10th century, Yogashataka written by Pandita Vararuci, describes only those formulations which are the most common and can be used in majority of the diseases.

The literal meaning of 'Sandhana' is Holding together, uniting, joining, binding, fixing, intimate union or combination. Sandhana Kalpana in Ayurveda means the drugs are combined together and are allowed to be in the same state without disturbing the process of Sandhana for a specific time period.

Sandhana kalpana is also called as 'Asavarista-vijnana', highlighting the preparation of Asava and Arista as two major preparations of this process.

Sandhana Etymology

सन्धीयते यद् इति सन्धानम्। (Sabdakalpadruma)

Combination of the specific drugs and keeping for a fixed time.

सन्धीयते आधीयते, ततोयाग्निसन्निकर्षादिसंस्कारादिनागुणान्तराण्यास्मिन्तत्सन्धानम्।

Transformation of the qualities of the drugs brought about by combination of the drugs and Jala or Kashaya and keeping it for some time is called Sandhana.

Sandhana Definition

द्रवेषु चिरकालस्थं द्रव्यं यत्सन्धितं भवेत्।आसवारिष्टभेदैस्तु प्रोच्यते भेषजोचितम्।। (Sha.Sam, M.Kha, 10/1)

केवलं द्रवद्रव्यं वा भेषजान्नादिसंयुतम्। चिरकालस्थितं वैद्यैः सन्धानं परिकीर्तितम्।। (Dra.Vi by Yadavji)

तत्यभेदद्वयं प्रोक्तं मद्यं शुक्तं तथैवच। (Paribhasa-prabandha)

The process of keeping dravadravya (kwatha, swarasa or any other liquid preparation), along with other oushadha dravya or the food preparations with or without Madhura dravyas (jaggery, honey or sugar), and praksepa dravya (Dhataki or Madhooka Pushapa) are mixed together in an inert vessel (mud pot, wooden vat, chaina clay vessel), sealed and kept undisturbed for a specified time period to facilitate the process of fermentation. Asava and Arişta are the two important preparations under Sandhana kalpana.

In Dipika commentary, Adhamalla', explained like this

आसवारिष्टभेदैरिति बहुवचनत्वेन सीधुसुरादिकमपि गृह्यते। सूयतेतोयकार्यक्रियतेयस्मिन् स आसवः। अरिष्टमितिद्रव्यप्रधानः। सीधुशब्देन मद्यभेदमाहुः, तच्चोभयप्रधानम्। सुरासवयोः प्रत्येकनिष्पादितयोरेकीकृत्यपुनः सन्धनो मैरेय इति संक्षेपेणोक्ता मद्यभेदाः। (Deepika Teeka) (Sandhana kalpana- 335)

In this shloka the word आसवारिष्टभेदैः belongs to plural form. That plural form indicates the Sidhu & different types of Suras here. Initially, they are explaining about what is a आसव. सूयते means distillation here. आसव- in which the water will be distilled. Arishta is the substantive. Here सीधु शब्द indicates different types of wine. Sidhu is also of two types. The differences between wine and liquor are briefly described as the combination of wine and liquor produced by each of them.

History

These preparations have a long history. In veda or purana period, we find the references of 'madya', 'sura', 'somarasa'. These were prepared with utmost care and auspiciousness and were used as medicinal liquids. However, in later periods these preparations were more in use as 'intoxicating drinks' with less 'medicinal value'. Appropriate use of these preparations will be a great boon to the medicinal world.

Fermentation

- Fermentation comes from the Latin word ferment are, meaning "to leaven."

- **"Fermentation is an anaerobic process in which energy can be released from glucose in the absence of oxygen."** OR
- "Fermentation is the incomplete oxidation of sugar into ethanol and carbon dioxide in the absence of oxygen, brought about by the enzymes invertase and zymase secreted by yeast cells".
- Fermentation is a metabolic process that is catalysed by enzymes, where in organisms convert starch or sugar to alcohol or an acid anaerobically releasing energy.
- The enzymes present in the yeast added to the sweetening agent diluted in liquid preparation, convert 'sugar' into 'glucose' and 'fructose' at first level.
- Further they convert the 'fructose' into 'ethanol' and 'carbon dioxide'. Ethanol here is the self-generated alcohol.

$$C_6H_{12}O_6 \text{ (Glucose)} \rightarrow 2\ C_2H_5OH \text{ (Ethanol)} + 2\ CO_2 \text{ (Carbon dioxide).}$$

Significance of Fermented Preparations

- Among all the kastoushada preparation, it has Infinite shelf life.
- It contains self-generated alcohol, which acts as preservative.
- As they become old, their therapeutic action increases.
- As it contains self-generated alcohol, because of vyavayi and vikasi guna of madya, it gets absorbed quickly and exerts its action.
- These are more palatable as they are prepared by using natural sweetening agents and flavoring agents, in addition they are also having therapeutic benefits.
- As this is a liquid dosage form, they are ready to administer at any given time.

Classification of Sandhana Kalpana

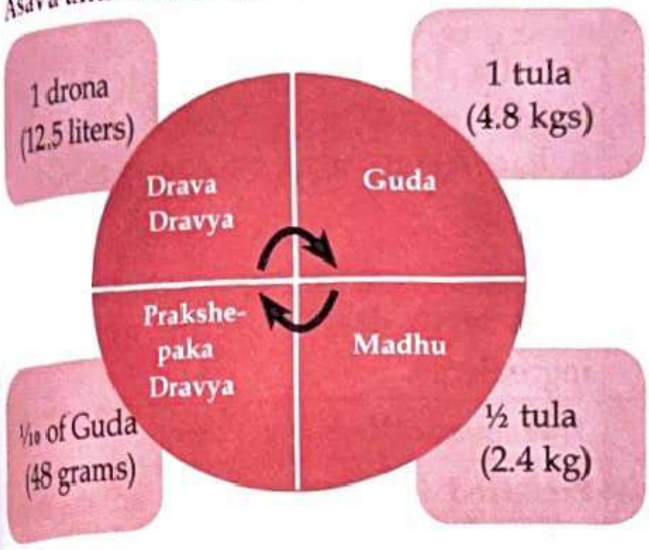
Madya (Alcoholic preparations)	Shukta (Acidic preparations)
1. Sura- a. Prasanna, b. Kadambari, c. Jagala, d. Medaka, e. Surabija	1. Sukta
2. Sidhu	2. Tusambu
3. Varuni	3. Sauvira
4. Asavarista	4. Kanjika
	5. Sandaki

Madhya & Shukta Difference

Madhya Kalpana (Alcoholic preparations)	Shukta Kalpana (Acidic preparations)
Fermentation is carried out by yeast cells.	Fermentation is carried out by acid bacilli.

Needs more than 15 days for fermentation or sometimes even up to six months.	Fermentation period usually within 8 days.
Sweetening agents like Jaggery, Sugar candy are added in all the preparations excepting sura.	Carbohydrates are mainly used as Fermenting media.

Asava and Arista- Anukta Mana



अनुक्तमानारिष्टेषु द्रव्द्रोणे तुलां गुडम्।
क्षौद्रं क्षिपेद् गुडादर्धं प्रक्षेपं दशमांशकम्।।
(Sha.Sam, M.Kha, 10/3)

When the quantity of the ingredients for Sandhana Kalpana is not mentioned, then these have to take as per the Anukta-paribhasha of Sandhana Kalpana.

In Dipika commentary, Adhamalla explained like this-

द्रव्यद्रोणे द्रोणद्वयपरिमिते द्रवे क्वाथादिके। तत्र तुलामिति सन्धानीयकद्रव्याणां क्षिपेत्। तानि मधुकपुष्पप्रभृतीनि गुडपरिमाणादर्धपरिमाण। मध्विति गुडमानमपि क्वाथद्रव्य-परिमाणदर्धं बोद्धव्यम्। प्रक्षेपं पश्चादेयं द्रव्यं दशमांशिकं गुडपरिमाणादित्यर्थः।।

Here they are explaining about the preparation of आसव (अरिष्ट/सुरा etc). The percentage of Dravadravya, Guda, Madhu and Praskshepa Dravya should be known for the preparation of Asava. If the ratio of the essential requirements in any Sandhana preparation is not specified in the classical verse, then the अनुक्तमान (general ratio) has to be taken into consideration. Here we need a big vessel, i.e. the vessel which have a capacity to boil the द्रोणद्वयद्रव्य. In that vessel we should put the balanced sandhanika materials for क्वाथ. Dravadravya, Guda, Madhu and Praskshepa Dravya's are the required materials. 1 द्रोण – द्रवद्रव्य, 1 तुला – गुड, ½ तुला – मधु, 1/10 of गुड – प्रक्षेपद्रव्य.

Difference Between Asava and Arista

Asava

यद् अपक्वौषधाम्बुभ्यां सिद्धं मद्यं स आसवः।। (Sha. Sam, M. Kha, 10/2)

Asava is the one which is prepared by fermenting oushadha dravyas with the liquids which are not subjected for heat process.

Arista

अरिष्टः क्वाथसिद्धः स्यात्तयोर्मानंपलोन्मितम्।। (Sha.Sam, M.Kha, 10/2)

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Arista is the one which is prepared by fermenting oushadha dravyas with the liquids which are subjected for heat process.

In brihatrayi there was not much difference between Asava and Arista, we can see the word Asava used for Agni siddha Sandhana Kalpana and vice versa. Sharangadhara is the first person to classify asava and arista and given the proper definition for them.

Asava	Arista
Swarasa, Hima are used as Dravadravya except in the preparation of Kumaryasava: Y. R. (Gulma), Drakssava: Ra. Tan Sa/S. Pra. San., Kharjurasava: Y. R. (ksaya), Madukasava: A. Hr. Ci. 10, Lodhrasava: A. Hr. Ci. 12 Gadanigraha (asava dhikara)	Kwatha, Phanta is used as dravadravya except in the preparation of Takrārişta: B. R. 8/609-10. *Cha Cha 14/72-75. *R.R. S 18/53-54.
Sheeta virya dravyas are the usual major ingredients.	Usna virya dravya are the usual major ingredients.
Therapeutically less Potent	Therapeutically more Potent
Preferred in pediatric case, Sukumara, alpa balavan, alpa roga bala.	Preferred in adult, balavan, adhika roga bala.
Indicatred in pittaja vikara.	Preferred in vata kaphaja vikara.

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General Method of Sandhana

Prime Ingredients

- **Drava Dravya** – Swarasa / Kwatha / Hima / Phanta of Specified Drugs
- **Madhura Dravya** – Guda, Sharkara, Phanita, Sita
- **Praksepaka Dravya** – Fine powders of specified drugs
- **Sandhana Dravya** – Fermentation initiators like Dhataki, Kusuma, Madhuka Pushapa, Kinva

Sandhana Patra

Sandhana Patra should be inert like Mud pot, Chinaware Vessels, Wooden vat, were explained in the classics. Now a days even Plastic Water tanks, Stainless steel Fermenters are also used.

Sandhana Kalpana Vidhi

क्वाथादौ भेषजद्रव्यंशर्करांमधुवागुडम्। सम्यागासवनिष्पत्यैकिञ्चित्किण्वंतथैव च।।
सन्धावस्थापयेज्जातरसंवस्त्रपरिस्रुतम्। मांसीमरिचलोहैस्तुप्रलिप्तेधूपितेऽथवा।।
शुचौभाण्डेमुखंरुध्वास्थापितंभेषजोचितम्। आसवारिष्टसंज्ञंतंकल्पमाहुश्चिकित्सका:।। (Dra.Vi by Yadavji)

Its method of preparation is given in Dravya Guna Vijñánam Paribhasa Khanda by Yadavji. According to that, take decoction etc. liquids, then mix sugar, jaggery or honey etc. sweet substances in liquids, add praksepa dravyas and for proper onset of fermentation some amount of kinva (fermenting agent yeast) remanent of old Asavarista may also be added. This mixture is then kept in a well cleaned and specially treated (Pasted with the prescribed paste of Jatamamsi, Maricha and Lodhra or fumigated with these drugs) Vessel (Stainless steel/plastic/wooden container for fermentation. When fermentation is over and specific taste and smell is developed, it must be filtered through a cloth and may be preserved. It is known as Asava arista preparation. The mouth of the vessel should be closed and kept either underground or in husk or in an air-conditioned room to avoid the influence of temperature variation for smooth onset and continuation of fermentation nearly at 40°C is considered ideal.

Preparation of Asava

- The specified drugs are made into coarse powder and soaked in sufficient quantity of water over night.
- Next day morning it is transferred to Sandhana patra which was subjected to Dhupana (Dhupana with Vidanga, Rajika, Jatamamsi, Maricha, Chandana etc.) added with specified quantity of water, Madhura dravya and prakshepaka dravyas.
- The mouth of the Sandhana Patra is covered with a clean cloth and placed in the midst of paddy husk.
- From next day the mouth of the sandhana patra is opened and stirred with a wooden stick until the onset of Fermentation.
- Once the onset of fermentation is confirmed, mouth of the Sandhana patra is sealed and and kept undisturbed for a minimum period of 15 days.
- Then onwards it should be opened once in every 15 days and check for the completion of Sanshana by performing the tests.
- If the Sandhana is not completed, Seal the mouth of the Sandhana patra and allowed to complete the fermentation.
- When the Sandhana process has completed, it should be filtered properly and stored in dry and sterile containers.

Preparation of Arista

The method of preparation of Arista is similar to that of Asava, only difference is that Kashaya of the drugs are prepared and used as Drava dravya.

Observations

Onset of Fermentation

1. Praksepaka dravya floating over the liquid.
2. Effervescence present.
3. Appreciation of hissing sound.
4. Appreciation of mild alcoholic odour & taste.
5. Burning candle will put off.
6. Lime water changes in to milky white.

Completion of Fermentation

1. Sinking of Praksepaka dravya.
2. Absence of effervescence.
3. Absence of hissing sound.
4. Appreciation of strong alcoholic odour and taste.
5. Burning candle continues to burn.
6. Lime water remains clear.

Burning Candle Test

When the fermentation process starts, the burning candle gets put off if taken near to the fermentation liquid within the pot. This is because of the carbon dioxide production during the fermentation process. After completion of fermentation, as there will be no carbon dioxide produced, the candle continues to burn.

Lime Water Test

Arrangement is made in such a way that the gas liberated during the fermentation process is passed to lime water. During the test when gas passes to lime water and if lime water turns milky, it indicates fermentation is going on. If lime water doesn't turn milky it indicates the completion of fermentation. It is done every week after onset of fermentation. Here 'turning of lime water to milky white indicates the production of carbon dioxide.

Asava and Arista- Dosage and Adjuvant

The general dosage of Asava and Arista is one pala (48 ml). It is administered with equal quantity of water after food.

Shelf Life

Indefinite according to Ayurveda classics

10 years as per revised guidelines

Important Factors in Asavarista Preparation

1. Drugs used for kwatha preparation.
2. Water for kwatha Kalpana.
3. Preparation of kwatha.
4. Selection of Sandhana patra.
5. Patra Samskara
6. Mixing of Madhura dravya into kwatha.
7. Prakshepaka dravya.
8. Place of fermentation.
9. Sandhana preraka dravya (fermentation initiators).
10. Residues in asavarista.
11. Percentage of alcohol in asavarista.
12. Addition of Bhasma in asavarista.
13. Sandhana kala (season for fermentation).

1. Drugs Used For Kwatha Preparation

Depending upon the type of the drug, Fresh or dry, Swarasa or Kashaya or hima or Phanta can be prepared as per the reference. Usually swarasa has to be prepared from fresh drugs. Kwatha or Hima or Phanta has to be prepared from dry drugs.

2. Water For Kwatha Kalpana

For all the Pharmaceutical process soft and potable water has to be used.

3. Preparation of Kwatha

Depending upon the nature of the drug, the quantity of water has to be taken like 4, 8 or 16 parts and reduced as per the reference. Coarse powder of the drugs should be taken. Maintain mild to moderate temperature through out the heating process. Vessel should be kept open during the heating process.

4. Selection of Sandhana Patra

In the classical text books, the vessels mentioned for Sandhana Kalpana are Mud Pot, Wooden watt and china clay vessels. Now a days in Pharmaceutical industry producing in large scale, they are using PVC tanks. In the recent advancement Stainless steel Fermenters are used for Sandhana Kalpana.

5. Patra Samskara

The preparation of Sandhana Patra before placing the ingredients in the vessel

has to be considered here. It includes washing and cleaning, Dhoopana (Fumigation), Application of Sneha dravya to the inner surface of the vessel, Sealing of the cracks if any. This is classified into

a) **Samanya Samskara:** Dhoopana, Ghrita lepana

b) **Visishta Samskara:** Amlatwa virodhi samskarana, Lepana samskara

a. Samanya Samskara

Dhoopana and Ghrita lepana: Dhoopana is done with the fumes of Rakshoghna Dravyas like Jatamamsi, Maricha, Vidanga, Siddarthaka, Guggulu etc. Then the inner surface of the vessel is smeared with goghrita.

b. Vishesha Samskara

Amlatwa virodhi Samskara: The vessel has to be washed thoroughly and filled with Sudha Jala (1:15- Sudha: Jala) and boiled for 1-2 hrs. The lime water is discarded and the vessel is washed with hot water for many times till the red litmus paper remain red colour for washed water. The vessel is exposed to sharp sunlight for 1 day and later it has to be used for Sandhana purpose.

Lepana Samskara: Application of 3 layers of the paste of Lodra anad Dhataki inside the vessel. Then again apply 3-4 layers of the paste of Sarjarasa dissolved in Methylated alcohol.

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6. Mixing of Madhura Dravya into Kwatha

Sweetening agents like Guda (jaggery) and Sarkara (sugar) are dissolved in the liquid medais like Swarasa, Kwatha, Hima or Phanta and filter thoroughly for once or twice to remove any physical impurities of the sweetening agent and then fill this in to Sandhana Patra.

7. Prakshepaka Dravya

The mixture of moderately fine powders of the Prakshepaka dravya is added to the liquid media in sandhana patra and mixed well.

8. Place of Fermentation

The required temperature for the proper fermentation is between 90°F-95°F (32°C-35°C). In olden days, Sandhana Patra are usually kept in the heap of Dhanya (Paddy) to maintain the temperature or usually pots were kept in a room where there will not be direct ventilation.

9. Sandhana Preraka Dravya (Initiators of Fermentation)

The Flowers are usually acting as Initiator of Sandhana. Dhataki Pushpa, Madhooka pushpa and kinva are used as Sandana preraka dravyas. Dhataki, is considered as best Sandhana prepaka dravya.

10. Residues in Aasavarista

The thick semisolid material present at the bottom of vessel is called Kinva. It is the mixture of Prakshepaka dravya and Dhataki pushpa/Madhooka pushpa. After decanting Asava or Arista, this is collected, dried and preserved for the next batch of Sandhana Kalpana.

11. Percentage of Alcohol in Asavarista

It is measured by Specific gravity method. Usually the percentage of alcohol in Asava and Arista is about 5-10%.

12. Addition of Rasadravyas in Asavarista

Addition of Rasadravya especially Swarna, Rajata, Loha in the form of thin foil or in the form of bhasma is mentioned in classical text books. These should be added after the completion of fermentation.

Eg. Saraswatarista, Lohasava, Kumaryasava

13. Sandhana Kala (Season for Fermentation)

As per the classical references the best season for Sandhana is Vasanta (March-April) and Sharad (Late- September, October & mid-November) ritu. During these seasons' climate is not cool, hence fermentation occurs properly. In other ritu climate will be cool, there may be chances of Fungal growth.

Now a days as these are preparing in the Pharmacy in a large scale with due precaution and using the advanced equipments and maintain the required room temperature can be prepared through out the year.

Madya Kalpana Preparations

As Asava and arista are Madaka (when used irrationally), they are called Madya.

Sura:

परिपक्वान्नसन्धानसमुत्पन्नां सुरां जगुः।। सुरामण्डः प्रसन्ना स्यात्ततः कादम्बरी घना।।
तदधो जगलो ज्ञेयो मेदको जगलाद्धनः। पक्वोऽसौ हृतसारः स्यात्सुराबीजं च किण्वकम्।।

(Sha.Sam, Ma.Kha. 10/5-6)

The liquid preparation obtained after complete fermentation of properly cooked rice is called Sura. Depending upon the consistency its layers are named as

First layer	• Pasanna (Sura manda)
Second layer	• Kadambari
Third layer	• Jagala
Fourth layer	• Medaka
Fifth layer	• Surabija (Bakkasa, Kinva)

Thickness of these increases from above downwards. Prasanna is the upper most clear supernatant liquid. Kadambari is the second layer below Prasanna comparatively thicker to Prasanna. Jagala is the third layer thicker to both the above layers. Medaka is the fourt layer semisolid in consistency of sura preparation. Surabija is the lower most layer and is solid in nature.

In Dipika commentary, it is mentioned that

इदानीं सुराविशेषलक्षणमाह-परिपक्वान्नेति। यत् शाल्यादिकं सम्पाच्य पुनः सन्धितं भवति तेन यत् समुपन्नं तां सुरां जगुः। एषां पेष्टी सुरा लोक वगनी शब्दवाच्या विख्याता। अथान्ये बहवो भेदास्तानाहसुरामण्डैत्यादिय: सुरामण्डः उपर्यच्छो भागः। घनस्तु सुराभाग एव, यः सुराया अधस्थितो भवति स जगलो ज्ञेयः। यो जगलात् किञ्चिद्-घनः स मेदकसुरासंज्ञः कादम्बर्या भिन्नः किञ्चिद्घनत्वात्। यो हतसारः स वक्कससंज्ञः। सुरा बीजं तु किण्वकमिति शालिपिष्टाप्रभवं किण्वकमिति कथितम्। एते सुराभेद दर्शिताः।।

Here the author explaining about the special characteristics of wine by the word परिपक्व. परिपक्व means completely ripened. Shali is one of the Dhanya. (कण्डनेन विना शुक्लाः हेमन्ताः शालयः स्मृताः-भावप्रकाश) By using the Shali and other Dhanyas which were cooked and combined with some other things Suras are prepared. These पैष्टी सुरा's are famous in the world as वगनी. There are many other types of Suras, such as Suramanda etc. Suramanda is the upper most part of the Sura. Thicker in consistency than Suramanda, and that which is under the Suramanda is to be understood as the jagala. That which is slightly denser than Jagala is called Medakasura and is different from Kadambari in being slightly denser. The essence in which is taken out is called vakkasa. The Surabija is called as Kinvaka. It is said to be prepared from rice flour. These are the different types of the Sura told by the Acharya.

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Sura- Properties

कासार्शोग्रहणीदोषमूत्राघातानिलापहा स्तन्यरक्तक्षयहिता सुरा बृंहणदीपनी।। (Su.Sam,Su.St 45/175)

Surā is useful in kasa, arsas, grahani roga and mutraghata. It alleviates vata and is useful in stanya and rakta ksaya. It is brmhaka and agni dipaka.

Prasanna (Madira)

सुरामण्डः प्रसन्ना स्यात्। (Sha. Sam, Ma Kha 10/5-6)

Prasanna is the clear supernated liquid. Chakrapani named it as Madira, मदिरातुसुरामण्ड. It is Ahladakara and highly madatyaya janaka (Intoxicating) due to its high percentage of Alcohol.

Guna and Karma

हिक्काश्वासप्रतिश्यायकासवर्चोग्रहारुचौ। वम्यानाहविबन्धेषु वातघ्नी मदिरा हिता।। (Cha. Sam, Su. St, 27/180)

Karma- Vataghna

Indication: Hikka, Swasa, Kasa, Pratishyaya, Vibandha, Aruchi, Vamana, Anaha

Kadambari

ततः कादम्बरी घना।। (Sha. Sam, Ma Kha 10/5-6)

Kadambari is comparatively thicker than the Prasanna.

Jagala

तदधो जगलो ज्ञेयो । (Sha. Sam, Ma Kha 10/5-6)

Jagala which is situated below the Kadambari, is thicker to both the above layers.

शूलप्रवाहिकाटोपकफवातार्शसांहितः। जगलोग्राहिरूक्षोष्णशोफनोभुक्तपाचनः।। (Cha.Sam, Su.St, 27/178)

Karma: Pachaka, Grahi

Indication: Shoola, Pravahika, Atopa, Kaphavataja Arsha, Shopha

Medaka

मेदको जगलाद्घनः। (Sha.Sam, Ma.Kha, 10/5-6)

Medaka is thicker than Jagala

Surabeeja

पक्वोऽसौ हत्सारः स्यात्सुराबीजं च किण्वकम्।। (Sha. Sam, Ma Kha, 10/5-6)

Surabeeja is the solid part at the base of the fermentation vessel. It is also called Vakkasa, Kinva.

1. Sidhu

सीधूरिक्षूरस ही पक्वैरपक्वैरसो भवेत्। आशृतश्चापि शीधुःस्यादित्याहुस्तद्विदो जनाः।

It is a fermentation preparation prepared by fermenting Ikshu Rasa (Sugarcane Juice). It is of two types–

1. Pakwa rasa Sidhu and
2. Apakwa rasa Sidhu

1. Pakwa rasa sidhu: Prepared by boiling Ikshu rasa.
2. Apakwa rasa sidhu: Prepared without boiling Ikshu rasa. It is also called Shitarasa sidhu. Some Acharyas considered it as Asava.

Sharangadhara considered shita rasas sidhu as the fermentation preparation of any Madhura drava dravya (Sweet Liquid) without boiling. Pakwa rasa sidhu is fermentation preparation of any madhura drava dravya (Sweet Liquid) by boiling process.

ज्ञेयःशीतरसः सीधुरपक्वमधुरद्रवैः। सिद्धः पक्वरसः सीधूः सम्पक्वमधुरद्रवैः।। (Sha.Sam, Ma.Kha, 10/4)

Sidhu- Properties

रोचनो दीपनो हृद्यः शोष शोफार्शसां हितः। स्नेह श्लेष्म विकारहनो वर्ण्यः पक्व रसोमतः।।

(Cha. Sam, Su. St, 27/181)

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Pakwa rasa sidhu acts as Rochana, Deepana, Hridya, Varnya and indicated in Shosha, Shopha, Arsha and also the diseases of Vata kapha and in the complication s due to excessive Snehapana.

जरणीयो विबन्धघ्नः स्वरवर्णविशोधनः। लेखनः शीतरसिको हितः शोफोदरार्शसाम्।।

(Cha.Sam, Su.St, 27/185)

Apakwa rasa sidhu acts as Pachaka, , Vibandha hara, Swara and Varna Shodhaka, Lekhaka. It is indicated in Shopha, Udara and Arshas.

Varuni

यत्तालखर्जूररसैः सन्धिता सा हिवारुणी।। (Sha.Sam, Ma.Kha, 10/6)

Varuni is prepared by fermenting Tala or Kharjura rasa.

वारूणी श्वेतसुरा। सा च पुनर्नवादि मूलयुक्तेन शालिपिष्टेन क्रियते। (Hemadri)

According to Hemadri Varuni is prepared by fermenting Punarnavadi mula and Rice flour. This is white in color.

Properties

सुरावद्वारुणी लघ्वी पीनसाध्मान शूलनुत्। (B.P, स.व. 24)

Like Sura, varuni is laghu and indicated in Peenasa Adhmana and Shoola

In Dipika commentary, Acarya Adhamalla explains

अथ वारुणीलक्षमाह-यत्तलेति। इदमपि सुराभेदः। तालः तालवृक्षः, खजूरो वृक्षविशेषः प्रसिद्धा, रस इति फलरसः सन्धितमिति पूर्ववत्, यद्वा तालखर्जूरवृक्षयोरुपरिभाग छित्वा तत्र घटमारोप्य यो रसो घटे पतिस्तत्रैव चिरकालस्थो भवति सा वारुणी, लोके सेन्धि शब्दवाच्या तद्गुणा वारुणी हृद्य लघुतीक्ष्णा निहति च।।

An incision is made at the tip of Tala or Kharjura tree. A pot is placed in such a way that the liquid oozing from the tip collects in the pot. This is kept for fermentation process. After the fermentation, the resultant liquid is called as Varuni. This is good for heart, Laghu and Teekshna Maireya.

सुरासवयोः प्रत्येक निष्पादितयोरेकीकृत्य पुनः सन्धानान्मैरेय। (Dalhana)

Maireya is prepared by mixing Sura and Asava together and kept for fermentation. As it is the combination of Sura and Asava it has the properties of the both.

मैरयं धातकीपुष्पं गुडधान्याम्ल संहितम्।

According to some other Acharyas, Maireya is prepared by fermenting Dhanyamla, Guda and Dhataki Pushpa.

Properties

According to Charaka, it is Madhura and guru. According to Sushruta it is Teekshna, Kashaya, Madakaraka, Vatahara and is indicated in Arsha, Kaphaja Gulma, Krimi and Medoroga.

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Sharkara

शर्करा प्राकृति आसवः शर्करः। (Chakrapanai)

शर्करासम्बन्धी मद्य विशेषः शर्करः। (Arunadatta)

गुड शर्करया खन्डशर्करया वाक्रियते य आसवः सशर्करः। (Dalhana)

Chakrapani and Arunadatta opined Sharkara is the fermentation preparation prepared by fermenting Sharkara (Sugar). According to Dalhana, it is prepared by fermenting either Guda or sharkara or Sita.

Properties

मुखप्रियः सुखमदः सुगन्धिर्बस्तिरोगनुत्। जरणीयः परिणताहृद्योवर्णश्चशार्करः।। (Cha. Sam, Su. St, 27/18)

It acts as Ruchya, Ahladakara, Sugandhi, Pachaka, Hridya Varnya. Indicated in Basti roga

Gauda

गुड़प्रकृतिकः आसवः गौडः।(Chakrapani)

Gauda is the fermented preparation prepared with guda.

Properties

सृष्ट भिन्न शकृद्धातौ गौड़स्तर्पण दीपनः । (Cha.Sam, Su.St, 27/182)

Gauda acts as Tarpana, Deepana and Vibandha hara

Aksiki

अक्षस्य-विभीतकस्य वल्कलैः सह कृतासुरा आक्षिकी। (Dalhana)

विभीतक वल्कलयुक्त शालिपिष्ट कृता सुरा आक्षिकी। (Hemadri)

According to Dalhana, sura prepared from pericarp of bibhitaka phala is Aksiki. According to Hemadri, sura prepared from bibhitaka phala majja and shalipista is Aksiki.

Properties

पाण्डु रोग व्रणहिता दीपनी चाक्षिकी मता। (Cha.Sam, Su.St, 27/183)

Aksiki is Vrana hita (wound healing), Deepana and indicated in Pandu roga

Kohala

यवसक्तकृतः कोहलः कोहलिका इति लोके। अन्येतुपुनः भक्तसुरामाहुः। (Su.Sam, Su.St, 45/180 Dalhana)

The fermented preparation prepared by fermenting Yavasaktu is called Kohala. It is also called as Bhaktasura.

Properties

त्रिदोषो भेद्यवृष्यश्च कोहलो वदनप्रियः। (Dipika Thika)

It is Tridoshaghna, Vrishya and Ruchya.

...ani and Arunadatta opined Sharkara is the fermentation preparati...
...fermenting Sharkara (Sugar). According to Dalhana, it is prepared by
...ther Guda or sharkara or Sita.

...ss Ruchya, Ahladakara, Sugandhi, Pachaka, Hridya Varnya. Indicated in

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Jambava

जम्बु फल रस तुम्बरीक्वाथ गुड़धातक्यादि कृत संस्कारो जाम्बव शीधुरुक्तः। (Su.Sam, Dalhana)

Jambava is the fermented preparation prepared by fermenting Jambu phala rasa, Tumbari Kwatha, Guda and Dhataki pushpa.

Properties

जाम्बवो बद्ध निस्यन्द स्तुवरो वातकोपनः। (Su.Sam, Su.St, 45/189)

Jambava is having Kashaya rasa, Vatakara and Mutra Sangrahaniya karma.

Madhulika

मधूलकः गोधूमभेदः। तत्कृतं मद्यं मधूलिकमिति। (Cha.Sam Su St. 27/182 Cakrapani)

Madhulaka is a variety of Godhuma (Wheat). The fermented preparation prepared by Madhulaka is called Madhulika.

गुर्वीजीयंति विष्टभ्य श्लेष्मलातुमधूलिका। (Cha.Sam, Su.St. 27/190)

It is Guru, Vistambhi, kaphakara.

Mardhvika

मार्द्वीकं द्राक्षारसोद्भवम् मद्यम्। (Arunadatta)

Mardhvika is the fermented preparation prepared by fermenting Draksha (Grapes).

Properties

मधुरं तद्धि रूक्षंच कषायानुरसं लघु। लघुपाकि सरं शोष विषमज्वरनाशनम्। (Su. Sam, Su.St 45/73)

मार्ध्विकं लेखनं हृद्यं नात्युष्णं मधुर सरम्। अल्प पित्ता निलंपाण्डु मेहार्शः कृमिनाशनम्।। (A. Hri, Su. St, 5/71)

According to Sushruta, it is Madhura Rasa, Kashaya Anurasa, Ruksha, Laghu, Sara, indicated in Shosha and Vishama jwara. According to Astanga Hridaya it is Madhura Rasa, having saraguna, Nati ushna, acts as Lekhana, Hridya, slightly vatapittakara, Indicated in Pandu, Prameha and Krimi.

Kharjura

खर्जूर रसोद्भवं मद्यंखार्जूरम्। (Su. Sam, Dalhana)

The fermented preparation prepared by Kharjura Rasa (Dates) is called Kharjura.

Properties

मार्दीकाकल्पान्तरं किंचिद् खार्जूरं वात कोपनम्। तदेव विशदं रुच्यं कफघ्नं कर्शनं लघु।
कषाय मधुरं हृद्यं सुगन्धीन्द्रिय बोधनम्।। (Su.Sam, Su.St, 45/174)

Kharjura slightly differs from Mardhvika, it is Vishada, Laghu, having Madhura rasa and Kashaya Anurasa. It slightly increases Vata, reduces kapha, It acts as Ruchya, Karshana, Hridya, Indriya Prabodhaka.

Surasava

आसुत्य च सुरा मण्डे मृदित्वा प्रस्तुतं पिबेत्। (Cha. Sam, K. St., 2/7)

यत्र सरया एवं तोयकार्य क्रियते स सुरासवः। (Chakrapani)

सुरा सयेत न्तोयकार्य क्रियते यस्मिन्स सुरासवः। (Dalhana)

तत्र मधुनैव सुरासन्धानेन या क्रियते तां सुरासरमाहुः। (Arunadatta)

Surasava is the fermented preparation prepared by keeping the drugs in Suramanda for some time and later rub it and filter. The resultant product is called Surasava.

According to Chakrapani and Dalhana, Sura is used as liquid media to extract the therapeutic principles in Surasava.

If we look in to the method of preparation of Surasava, it can be compared to Tinctures of modern medicine and homeopathy system of medicine.

Properties

सुरासवस्तीव्रमदो वातघ्नों वदनप्रियः। (Cha.Sam, Su.St., 27/18)

तीक्ष्ण सुरासवोहृद्यो मूत्रल कफवातनुत्। मुखप्रियः स्थिरमदो विज्ञेयो अनिलनाशनः। (Su.Sam, Su.St., 45/187)

Surasava is highly madakaraka (Intoxication), Vatahara, Ruchya, Teekshna, Hridya, Mutrala, Kaphavatahara.

Shandaki

षण्डाकीराजिकायुक्तैः स्यान्मूलकदलद्रवैः। सर्षपस्वरसैर्वाऽपि शालिपिष्टक संयुतै। (B.P., 13)

The fermented preparation prepared by Mulaka Patra Swarasa or Sarshapa Swarasa with the addition of Rajika and Shali Pista.

षण्डाकी सन्धिता ज्ञेया मूलकैः सर्षपादिभिः। (Sha.Sa. Ma. Kha, 10/12)

The fermented preparation prepared by fermenting Mulaka, Sarshapa etc dravyas.

मूलक सर्षपशाकानि क्वथितासुतानि कालजीरकराजिका। सुभावितानि–अम्लतीक्ष्णानि शाण्डाकी शब्देनोच्यन्ते।
(Arunadatta)

The fermented preparation prepared by fermenting Mulaka and Sarshapa Kashaya with Krishna jiraka, Swetha Sarshapa. This is having Amla rasa and teekshna in nature.

Shukta Kalpana

Shukta Kalpana is the second form of Sandhana Kalpana. In these preparations the final products will become more sour in taste. This preparation is acidic in nature rather than alcoholic. Usually alcoholic preparations contains five rasas, but Shukta Kalpana contains Amla rasa.

Definition

कन्दमूलफलादीनि सस्नेहलवणानि च यत्र द्रवेभिषयन्ते तत् शुक्तं अभिधीयते।। (Sha.Sa. Ma.Kha, 10/7)

When Fermentation is done by using the drugs like Kanda (tubers), Moola (root), Phala (Fruit), Sneha (Ghrita, Taila) and Lavana, the resultant fermented liquid is called Shukta.

विस्रमम्लतां यातं मद्यं वा मधुरद्रवम्। विनष्टः सन्धितो यस्तु तच्चुक्रभिधीयेते। (Dra. Vi by yadavji)

During the process of Sandhana, madya preparation or any sweet liquid turns to Amla rasa on its own or due to spoilage is called Shukta.

सर्वमद्यं पंचरसं कालनत्रवशाद्यदा। त्यक्त्वान्यरस मम्लत्वं याति शुक्तंतदुच्यते।। (Dalhana)

When Madya looses all other rasas except Amla rasa, kept it for longer duration for Sandhana than it is called Shukta.

Rasa of Shukta

त्यक्त्वान्यरसममलत्वंयातिशुक्तंतदुच्यते।। (Dalhana)

Shukta is having Amla Rasa

Properties of Shukta

रक्तपित्तकरं शुक्तं छेदिमुक्तविपाचनम्। वैस्वयं जरणं श्लेष्मपाण्डु क्रिमि हरं लघु।।
तीक्ष्णोष्णं मूत्रलं हृद्यं कफघ्नं कटुपाकि च। (Su. Sam, Su. St, 45/210)

रक्तपित्तकफोत्क्लेर्दि.....पाण्डदृक्कृमिनाशनम्। (A. Hri.Su. St, 5175-76)

शुक्तं कफघ्नं तीक्ष्णोष्णं.....भेदनंरक्तपित्तकृत।। (B. P, Pra. Kha)

Shukta is Ushna, laghu and teekshna, under goes katu vipaka and acts as chedi, pachaka, mutrala, kaphahara, vaiswaryakara. Indicated in Pandu and Krimi roga.

Types of Shukta Kalpana

1. Kanjika

सन्धितं धान्यमण्डादि काञ्जिकं कथ्यते बुधैः।

That fermented Dhanyamanda to acidic taste is known as Kanjika.

तुलामितंषष्टिकतण्डुलश्चप्रगृह्यचात्रंविधिवद्वधाय। द्रोणेऽम्भसिक्षिप्तमथत्रियामास्तत्सप्तरक्षेत्पिहितंप्रयत्नात।।
ततस्तुकल्कंसकलंनिरस्यात्तत्कांजिकंकथ्यतआरनालम्। तद्भेदितीक्ष्णंलघुपाचनंचदाहज्वरघ्नंकफवातनाशि।।

(Ayurveda vijnana)

One tula of Shastika shali is boiled to prepare cooked rice. One Drona water is added to it and the mouth of the vessel is sealed properly and kept undisturbed for 3 days. Later the rice is separated and the resultant liquid is called Kanji. It is also called as Aranala.

कुल्माषधान्यमण्डादि संधितं कांजिकं विदुः।। (B.P. 21 /1-2)

Kanji is prepared by fermenting half baked Masha (Black gram) and Dhanya Manda.

Properties

काञ्जिकं भेदितीक्ष्णोष्णरोचनं पाचनं लघु। दाहज्वरहरं स्पर्शात्पानाद्वात कफावहम्।

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माषादि वटकैर्युक्तं क्रियते तदुगुणांधिकम्। लघु वात हरं तत्तु रोचनं पाचनं परम्।
शूलाजीर्णा विबन्धाम नाशनं वस्तिशोधनम्।।

These shlokas explaining about the properties of Kanjika. Kanjika is Ushna, Teekshna, Laghu, Amla Rasa, Bhedana, Rucikara, AmaPachana, Vata Kaphaghna, Daha and Jvarashamaka. If Masha and other things are added, its properties are enhanced and fermentation also starts earlier. In that case it becomes very tasty, pachana, vatahara and good for curing shoola, ajirna and vibandha. It should not be used in Shosha, Murccha, Bhrama, Kandu, Kustha, Rakta Pitta, Rajayakshma, Kshata Ksheena and Manda Jwara as it provokes pitta dosa.

2. Sauviraka

यवैस्तु निस्तुषै पक्वै सौवीरं सन्धितं भवेत्। (Sha. Sam, Ma. Kha, 10/11)

यवैस्तु निस्तुषैः पक्वैः सौवीरं संधितं भवेत्।। (Dra.Vi by Yadavji - 31/5)

Nistusha (Dehusked) yava is boiled and subjected to Sandhana Kalpana. The resultant acidic preparation is called Sauviraka.

सौवीरं तु यवैरामैपक्वे वीनिस्तुषीकृतैः गोधूमैरपिसौवीरमाचार्याः केचिदकचिरे।। (Yo. Ma.)

Sauviraka can be prepared by fermenting Nishtusha Apakwa or Pakwa Yava or Godhuma.

सुनिस्तुषश्च पक्वैश्च सौवीरं चानृतंभवेत्।। (Vai.Pa. Pra)

Properties

तुषाम्बुदीपनं हृद्यं हृत्पाण्डुकृमिरोगनुत्। ग्रहण्यर्शो विकारघ्नं मेदिसौवीरकं तथा।। (Su.Sam, Su.St 45/213)

Sauviraka and Tushambu is deepaka, hridya, medo vardhaka and indicated in Hridroga, Pandu and Krimi roga

3. Tushambu (Tushodaka)

तुषाम्बु संधितं ज्ञेयंआमैः विदलितयवैः। (Dra.Vi by Yadavji - 31/5)

तुषाम्बु सन्धितं ज्ञेय मामैर्विदलितैर्यवैः। (Sha.Sam, Ma.Kha, 10/10)

तुषाम्बुचाशृतं ज्ञेय मामैर्विदलितैर्यवैः। (Vai.Pa. Pra)

तुषोदकं यवैरामैः सतुषैः शक्लीकृतैः। (Yo. Ma)

Tushambu can be prepared by fermenting Apakwa (Aama-with out baking) and broken Yava with husk. The resulting acidic preparation is called Tushambu.

Properties

तुषाम्बुदीपनं हृद्यं हृत्पाण्डुकृमिरोगनुत्। ग्रहण्यर्शो विकारघ्नंमेदि सौवीरकं तथा।। (Su.Sam, Su.St, 45/213)

Both Tushambu and Sauviraka possess same properties. According to Sushruta Samhita, these are Deepana, Hridya, Bhedana, and destroys Hridvikara, Panduroga, Krimiroga, Grahani and Arshas.

According to Bhava Prakasha, Tusodaka is claimed as Ushna and Teekshna, Amapachana, Rakta and Pitta vikarahara and destroyer of Vastishoola while Sauviraka is Kaphaghna, Deepana and good for Udavarta, Anaha, Angamarda and Asthishoola.

4. Dhanyamla

धान्याम्लं शलिचर्णाच्य कोद्रवादि कृतं भवेत्। (B.P.)

धान्याम्लं काञ्जिकं शालिजीर्णह्न कोदैवादिकृतंमद्यम्। (Dalhana)

धान्याम्लं तण्डुल कण्डनादिकृतम्। (Arunadatta)

Acidic preparation prepared by fermenting Shali choorna or Tandula with Kodrava is called Dhanyamla.

प्रस्थं षष्टिक धान्यस्य नीर प्रस्थ द्वये क्षिपेत्। आधार भांडं संरुध्य भूमेर्गर्भे निधापयेत्।।
पक्षादश समुद्धृत्य वस्त्रपूतश्चकारयेत्। ततो जातरसं योज्यं धान्याम्लं सर्वकर्मसु।। (Ayurveda vijnana)

One Prastha Shasti Dhanya and Water 2 Prastha taken together in a mudpot. The mouth of the pot is sealed and kept in a pit made in the ground and covered with mud. After 15 days it is taken out and filtered through cloth. The resultant preparation is called Dhanyamla.

CHAPTER SEVEN

Parada Samskaropayogi Dhanyamla

नानाधान्यैर्यथाप्राप्तैस्तुषवर्जैर्जलान्वितैः। मृद्भांडं पूरितं रक्षेद्यावदम्लत्वमाप्नुयात्।।६२।।
तन्मध्ये भृंगराण्मुण्डी विष्णुक्रांता पुनर्नवा। मीनाक्षीचैवसर्पाक्षीसहदेवीशतावरी।।६३।।
त्रिफला गिरिकर्णी च हंसपादी च चित्रकम्। समूलं कुट्टयित्वा तु यथालाभं विनिक्षिपेत्।।६४।।
पूर्वाम्लभाण्डमध्ये तु धान्याम्लकमिदंस्मृतम्। स्वेदनादिषु सर्व रसराज्यस्य योजयेत्।।६५।। (Pa. Sam)

सर्वधान्याम्लसन्धानं तुषवर्ज्यतुकारयेत्। ततस्तत्रैव सन्धाने निक्षिपेदोषधीरिमाः।।६६।।
गिरिकर्णी च मीनाक्षी सहदेवीपुनर्नवा। उरगा त्रिफला क्रान्ता लघुपर्णी शतावरी।।
तेन युक्तं रसं स्विन्नं त्रिदिनं मृदुवह्निना। दोलायन्त्रेण तीव्रेण मर्दयित्वापुनः पुनः।। (Dhanvantari Samhita)

Collect a variety of de-husked grains and put them in a clean pitcher. Fill the pitcher with water, seal it, and bury it in the earth until it becomes sour. Then, add water to the vessel along with powdered roots of drugs such as Mundi, Vishnukranta, Punarnava, Meenakshi, Sarpakshi, Sahadevi, Shailavari, Triphala, Girikarni, Hamsapadi, and Chitraka. The resulting liquid is known as Dhanyamla and is used for Swedana and other Parada Samskaras.

Grains without husks are added to water and left for fermentation. After it turns sour, the powder of roots from herbs such as Girikarnika, Meenakshi, Shunthi, Triphala, Vishnukranta, Murva, and Shatavari are added. The resulting liquid is called Dhanyamla, which is used for Parada Samskaras.

5. Aranala

आरनालन्तु गोधूमैरामैः स्यान्तिस्तुषीकृतैः। पक्वेर्वासन्धितैस्तत्तु सौवीरसदृशंगुणैः।। (B. P, 10)

The dehusked aama or pakwa Godhuma (Wheat) is subjected to fermentation process. The resultant product is called Aranala. Its properties are similar to sauvira.

6. Guda Shukta

गुडाम्बुना सतैलेन सन्धानं काञ्जिकन्तुयत्। कन्दशाक फलैर्युक्तं गुड़शुक्तंतदुच्यते। (Dalhana)

Guda Shukta is prepared by fermenting Gudambu (Liqiud jaggery), along with Kanda (Tubers), Shakha (Leaves), and Phala (Fruits). Its propertis are similar to Kanjika.

7. Madhu Shukta

जम्बीरस्य फलरसं पिप्पली मूलसंयुतम्। मधुभाण्डे विनिक्षिप्य धान्यराशौनिधापयेत्।।

त्र्यहेण तज्जातरसं मधुशुक्त-मुदाहृतम्। (Dalhana)

जम्बीरस्वरसप्रस्थं.....मधुशुत्रःतदुच्यते।। (Vai. Pa. Pra)

Madhu Shukta is prepared by fermenting Jambira Phala rasa, Madhu and Pippali Mula and keeping the vessel in heap of Dhanya for three days.

Properties

Madhu Shukta is more guru than Guda Shukta

8. Asuta

सन्धानाच्चिरकालाम्लमासुतं परिकीर्तितम्। (Hemadri)

During fermentation process, the sandhana dravyas are kept longer duration and if it attains amla rasa then it is called as Asuta.

9. Chukra

विनष्टमम्लतां यातं मद्यं वा मधुरद्रवं बिनष्टः सन्धितो यस्तु तच्चुक्रमभिधीयते। (Sha. Sam, Ma. Kha, 10/8-9)

During the process of fermentation, if the liquid (Madya) or fermented madhura drava (Ikshu rasa, Draksha rasa etc) become sour (amla) then it is called Chukra'.

In Dipika commentary of 'Acarya Adhamalla', it is explained

विनष्टमम्लतां यातंमद्यमितितदुच्यते। सर्वं मद्यं पञ्चरसं कालान्तरवशाद् यदा संयुज्य परमम्लत्वं याति शुक्तं तदुच्यते इति। मधुरद्रवमिति गुडेक्षुरसमथुप्रभृतिकम्। तथाहि– यन्मध्वादौ शुचौ भाण्डे सहुडक्षौद्रकाञ्जिकम्। धान्यराशौ शुक्तं चुक्रं तदुच्यते इति। विनष्ट इति विगतरसः। सन्धितः सन्धानीभूताः।।

That which is destroyed and became an acidic, is called as wine. When all the five tastes of liquor are combined and become extremely acidic due to the interval of time, it is called pure. Sweet liquid refers to sugarcane juice and honey. For example - that in a clean vessel with honey and sugarcane juice. That Shukta is called chukra which is kept in a heap of grain. Destroyed is devoid of taste. Sandhita is joined and became a joint.

CHAPTER SEVEN

Madhya

Definition

बुद्धिं लुम्पति यद्द्रव्यं मदकारि तदुच्यते। तमोगुणप्रधानं च यथा मद्यं सुरादिकम्।। (Pra.Kha.Kha. 4/22)

येयेन्मादकं लोकैस्तन्मद्यमभिधीयते यथाऽरिष्टं सुग।

An intoxicating drink which numbs the mind, brings in 'Madakata' and सीधुरासवाद्य-मनेकधा।। (B. P. Sandhana varga) 'Tamoguna'. This is of many varieties and called with different names. Sura, Sidhu, Asavarishta all these come under this group. This in layman language is called as 'Madya'.

Madya Properties

सर्वं पित्तकरं मद्यमम्लं रोचनदीपनम्। भेदनं कफवातघ्नं हृद्यं बस्तिविशोधनम्।।
पाके लघु विदाह्युष्णं तीक्ष्णमिन्द्रियबोधनम्। विकासि सृष्टविण्मूत्रं शृणु तस्य विशेषणम्।। (Su Sa. 45/171)

Madya in any form is pittakaraka. It will be Amla, Rucikaraka, Agnidipaka, Mala-Bhedaka, Kapha-Vata shamaka, Hrdya, Basti Shodhaka, Pachaka, Laghu, Vidahi, Ushna, Tiksna, Indriya avabodhaka, Vikasi and Mala-Mutra saraka.

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Rasa of Madya

सर्वमद्यंपंचरसं

All the wine is having five types of tastes.

Another Reference

मद्यं सर्वं भवेदुष्णं पित्तकृद्वातनाशनम्। भेदनं शीघ्रपाकं च रुक्षंकफहरंपरम्।।
अम्लं च दीपनं रुच्यं पाचनं चाशुकारि च। तीक्ष्णं सूक्ष्मं च विशदं व्यवायि च विकाशी च।।

(B. P. Sandhana varga)

Madya in any form is Ushna, Pittavardhaka, Vatanashaka, Malabhedaka, Pachaka, Ruksya, Kaphaghna, Amla-Rasa-Yukta, Agnidipaka, Ruchikaraka, Asukari, Tiksna, Suksma, Vishada, Vyavayi and Vikasi.

Another Reference

हिक्काश्वासप्रतिश्यायकासवर्चोग्रहारुचौ। वम्यानाहविबन्धेषु वातघ्नी मदिरा हिता।। (Cha. Sam, Su.St. 27/180)

Madya in specific quantity is useful in curing Hikka, Shwasa, Pratisyaya, Kasa Malagraha, Aruchi, Vamana, Anaha, Vibandha and vitiated vata.

Sevana Yogya Madya

चिरस्थितं जातरसं दीपनं कफवातजित्। रुच्यं प्रसन्नं सुरभि मद्यं सेव्यं मदावहम्।। (Su.Su. 45/203)

The madya which has been preserved properly for many days after complete fermentation; is intact with all its inherent properties such as taste, odour and color; and the one which is Agnidipaka (appetizer), Kapha-Vata shamaka, Ruchikaraka (tasty), Harshadayaka (exciting) and Sugandhayukta (aromatic) madya is fit to be consumed.

Madya- Benefits as Medicine

हर्षणं प्रीणनं मद्यं भयशोकश्रमापहम्। प्रागल्भ्यवीर्यप्रतिभातुष्टिपुष्टिबलप्रदम्।।
सात्त्विकैर्विधिवद्युक्त्या पीतं स्यादमृतं यथा। (Cha.Sam, Su.St. 27/194-195)

The madya consumed in stipulated quantity keeps the person happy and content. It relieves fear, sorrow and fatigue. It improves virya and pratibha. It does Tushti and pusti. It is Balakaraka and Amrta-tulya if consumed rationally as medicine.

Madya Dosha

सान्द्रं विदाहि दुर्गन्धं विरसं कृमिलं गुरु।। अहृद्यं तरुणं तीक्ष्णमुष्णं दुर्भाजनस्थितम्।
अल्पौषधं पर्युषितमत्यच्छ पिच्छिलं च यत्।। तद्वर्ज्यं सर्वथा मद्यं किञ्चिच्छेषं च तद्भवेत्।

(Su.Sam, Su. St 45/197-199)

The madya; which is very thick, which causes burning sensation, one with bad odour, distasteful, infested and heavy for digestion, ahrdya (disliked).

The one, which is newly prepared, very tiksna and ushna, stored in unsuitable container and prepared with less number of medicinal drugs than required.

The one, which is replaced from fermented vessel and placed open overnight, very thin and slimy; such madya has to be discarded and should not used.

It vitiates all the doshas and is hazardous to health.

Madya- Influence over body

तस्यानेकप्रकारस्य मद्यस्य रसवीर्यतः।।
सौक्ष्म्येदौष्ण्याच्च तैक्ष्ण्याच्च विकासित्वाच्च वह्निना समेत्य हृदयं प्राप्य धमनीरूर्ध्वमागतम्।।
वृक्षोभ्येन्द्रियचेतांसि वीर्य मदयतेऽचिरात्।। (Su. Sam, Su. St. 45/205)

Madya by its tikshna rasa, ushna virya, vikasi guna and prabhava mingle with gastric juices and travel through heart and blood vessels to brain.

It causes a kind of intoxication or numbness in the sense organs and manas.

अशौचनिद्रामात्सर्यागम्यागमनलोलताः। असत्यभाषणञ्चापि कुर्याद्धि तमसो मदः।। (Su. Sam, Su. St. 45/209)

Person intoxicated with Madya does indecent activities, becomes drowsy and experiences the feelings of jealousy and greed. He speaks untruth, gets sexually aroused and as a result continues his indecent behavior until he is under the influence of madya.

Examples:

Draksharista

द्राक्षातुलार्धं द्विद्रोणे जलस्य विपचेत्सुधीः। पादशेषे कषाये च पूते शीते विनिक्षिपेत्।
गुडस्य द्वितुलां तत्र त्वगेलापत्रकेशरम्।। प्रियङ्गुमरिचं कृष्णा विडङ्गं चेति चूर्णयेत्।
पृथक्पलोन्मितैर्भागैस्ततो भाण्डे निधापयेत्।। समन्ततो घट्टयित्वा पिबेज्जातरसं ततः।
उरः क्षतं क्षयं हन्ति कासश्वासगलामयान्। द्राक्षारिष्टाह्वयः प्रोक्तोबलकृन्मलशोधनः।

(Sha.Sam, Ma.Kha, 10/69-73)

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Ingredients

a) Kwatha dravya: Draksha- ½ tula (2.4 kgs)
Water for decoction- 2 drona (24 liters), reduced to- ¼ (6 liters)

b) Madhura dravya: Guda- 2 tula (9.6 kgs)

c) Praksepa dravya: The fine powders of 1. Twak, 2. Sukshma ela, 3. Tejapatra, 4. Nagakesara, 5. Priyangu puspa, 6. Marica, 7. Pippali, 8. Vidanga, 9. Dhataki puspa each 1 pala (48 gms)

Method of Preparation

Draksha Kashaya is prepared and kept in the fermentation pot, vessel or barrel. Then Jaggery is dissolved, filtered and added. Later, Prakshepaka drugs are finely powdered and added. Then after adding Dhataki Pushpa, the mouth of the pot, vessel or barrel is covered with an earthen lid and the edges are sealed. The container is kept either in a heap of paddy, so as to ensure that for the duration of fermentation, as far as possible, a constant temperature may impede or accelerate the fermentation. After the completion of fermentation, the lid is removed, and filtered.

Dose & Anupana : One pala (48 ml) along with equal quantity of water after food.

Indication : Urahkshata, Kshaya, Kasa, Swasa and Gala roga (disease of throat). This is Balya and Vibandha hara.

Ushirasava

उशीर बालकं पद्मं काश्मर्यं नीलमुत्पलम्। प्रियङ्गं पद्मकं लोध्रं मञ्जिष्ठां धन्वयासकम्।।
पाठांकिराततिक्तञ्च न्यग्रोधेदुम्बरं शटीम्। पर्पटं पुण्डरीकं पटोल काञ्चनारकम्।।
जम्बूशाल्मलिनियसं प्रत्येकं पलसम्मितम्। भागांस्तु चूर्णितान्कृत्वा द्राक्षायाः पलविंशतिम्।।
धातकीं षोडशपलां जलद्रोणद्वये क्षिपेत्। शर्करायास्तुलां दत्त्वा क्षौद्रस्यार्द्धतुलां तथा।।
मासैकं स्थापयेद्भाण्डे मांसीमरिचधूपिते। उशीरासव इत्येष रक्तपित्तविनाशनः।
पाण्डुकुष्ठप्रमेहार्शः कृमिशोथहरस्तथा।। (B.R Raktapitta 162-166)

Ingredients

Ushira, Netrabala, Netrabala (Root), Gambhari (Bark), Nilakamala, Priyangu, Padmaka, Lodhra, Manjistha, Dhanvayasaka, Patha, Kiratatikta, Vata (Its Shoots and Bark), Udumbara (Fruit and Bark), Shati, Parpata, White Lotus (Root and Leave), Patola Leaves), Kanchanara (Bark or Flower), Jambu (Bark) and Mocarasa each 1 pala powder.

Draksha	-	20 pala
Dhataki	-	16 pala
Jala	-	2 Drona
Sharkara	-	1 tula
Madhu	-	½ tula

Method of Preparation

Take a mud pot and is smeared with ghrita. Then expose it to the fumes of Jatamamsi and maricha for sterilizing the pot. Take prescribed quantity of potable water in the pot and add the mixture of the powders and mix it thoroughly. Later add Draksha, Dhataki, Sharka and Madhu and stirred well. Close the mouth of the pot and keep the pot for 1 month in the heap of Dhanya. Later filter it and preserve in air tight glass bottles.

Dose & Anupana: 12 to 24 ml along with equal quantity of water after food

Indication: Raktapitta, Pandu, Kustha, Prameha, Krimi and Shotha

Parthadyarista (Arjunarista)

पार्थत्वचंतुलामेकां मृद्वीकार्द्धतुलां तथा। भागं मधूकपुष्पस्य पलंविंशतिसम्मतम्।।
चतुर्द्रोणेअंभसः पक्त्वा द्रोणमेवावशेषयेत्। धातक्या विंशतिपलं गुडस्य तुलां क्षिपेत्।।
मासमात्रं स्थितो भाण्डे भवेत्पार्थाद्यारिष्टकः। हृत्फुफुसगदान्सर्वान्हन्त्ययं बलवीर्यजकृत्।। (B.R 33/75-76)

Ingredients

S.No.	Ingredients	Quantity
1	Arjuna Twak	4.8 kg
2	Mridhwika	2.4 kg
3	Madhuka Pushpa	960 g
4	Jala	49.152 liters
5	Dhataki	960 g
6	Guda	4.8 kg

Method of Preparation

Arjuna Twak, Mridhwika and Madhuka Pushpa are taken along with jala and subjected to kwatha preparation and reduced it to ¼ quantity and filtered. The filtrate is taken in Sandhana Patra and Dhataki Pushpa and Guda are added. The vessel is kept for fermentation. After 1 month, it is filtered and preserved in air tight glass bottles.

Dose & Anupana: 12 to 24 ml along with equal quantity of water after food

Indications: Hridroga, Puppusa roga, Bala kshaya, Napumsakata

Takrarista

यवन्यामलके पथ्या मरिचं त्रिपलंशिकम्। लवणानि पलांशानि पञ्चचैकत्र चूर्णयेत्।
तक्रं तदासुतं जातं तक्रारिष्टं पिबेन्नरः। दीपनं शोथगुल्मार्शः क्रिमिमेहोदरापहम्।। इतितक्रारिष्टः।
(Cha.Sam.Chi.St. 15/120-121)

Ingredients

S.No.	Ingredients	Quantity
1	Ajamoda	3 Pala (144 gms)
2	Amalaki	3 Pala (144 gms)
3	Haritaki	3 Pala (144 gms)
4	Maricha	3 Pala (144 gms)
5	Saindava lavana	1 Pala (48 gms)
6	Sauvarchala lavana	1 Pala (48 gms)
7	Vida lavana	1 Pala (48 gms)
8	Samudra lavana	1 Pala (48 gms)
9	Aoudbida lavana	1 Pala (48 gms)
10	Takra	1 Adaka (3 liters)

Method of Preparation

Mud pot is taken and smeared with ghrita. Then it is exposed to the fumes of Jatamamsi and Maricha for sterilizing the pot. Prescribed quantity of Takra is taken in the pot and the mixture of the powders are added and mixed thoroughly. The mouth of the pot is sealed and kept the pot for 3 weeks in the heap of Dhanya. Later it is filtered and preserved in air tight glass bottles.

Dose & Anupana: 12 to 24 ml along with equal quantity of water after food

Indications: Shotha, Gulma, Arshas, Krimi, Prameha, Udara

Lohasava

लोहचूर्ण त्रिकटुकं त्रिफलां च यवानिकाम्। विडङ्गं मुस्तकं चित्रं चतुःसंख्यापलं पृथक्।।
धातकीकुसुमानां तु प्रक्षिपेत्पलविंशतिम्। चूर्णीकृत्य ततः क्षौद्रंचतुः षष्टिपलं क्षिपेत्।।
दध्यत् गुडतुलां तत्र जलद्रोणद्वयं तथा। घृतभाण्डे विनिक्षिप्य निदध्यान्मासमात्रकम्।।
लोहासवममुं मर्त्यः पिबेद्वह्निकरं परम्। पाण्डुश्वयथुगुल्मानि जठराण्यर्शसां रुजम्।।
कुष्ठं प्लीहामयं कण्डूकासं श्वासं भगन्दरम्। आरोचकं च ग्रहणीं हृद्रोगं च विनाशयेत्।।

(Sha.Sam.Ma.Kha. 10/34-38)

Ingredients

S.No.	Ingredients	Quantity
1	Loha churna - Shodhita (Lauha)	192 g
2	Shunti	192 g
3	Maricha	192 g
4	Pippali	192 g

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5	Hareetaki	192 g
6	Vibhitaki	192 g
7	Amalaki	192 g
8	Yavanika (Yavani)	192 g
9	Vidanga	192 g
10	Mustaka (Musta)	192 g
11	Chitra (Eranda)	192 g
12	Dhataki	192 g
13	Ksaudra (Madhu)	3.072 kg
14	Guda	4.800 kg
15	Water	24.576 liters.

Method of Preparation

Take a mud pot and is smeared with ghrita. Then expose it to the fumes of Jatamamsi and Maricha for sterilizing the pot. Take prescribed quantity of potable water in the pot and add the mixture of the powders and mix it thoroughly. Later add Dhataki, Guda and Madhu and stirred well. Close the mouth of the pot and keep the pot for 1 month in the heap of Dhanya. Later filter it and preserve in air tight glass bottles.

Dose & Anupana: 12 to 24 ml along with equal quantity of water after food.

Indications: Agnimandya, Pandu, Shvayathu, Gulma, Arsha, Pleeha, Kushta, Kandu, Kasa, Shwasa, Bhagandara, Aruchi, Grahani, Hrudroga.

Role of Sandhana dravya in the process of Fermentation

Role of Microbes in Sandhana Kalpana: Involvement of microbes in fermentation process is a compulsory trend. During fermentation process, microbes help in the generation of alcohol from sweetening agents or from carbohydrate sources. In one of the studies, the effect of addition of yeast (Saccharomyces cerevisiae) and Dhataki pushpa to fermenting media was studied. The study reveals that the onset and completion of fermentation process in the samples containing yeast were quick, as in these samples, fermentation started on the 2nd day and was completed within 1 month. However, in the group where yeast was not used, fermentation started on the 5th day and was completed in the 2nd month. Fermentation may be delayed because of natural growth and multiplication of yeast cells as well. To know the role of other microbes if any, in production of alcohol during fermentation process a study was conducted. In this study, microbial composition at initial stages of fermentation of was assessed by culture-independent

16S rRNA gene clone library approach. At the 0 day of fermentation, Lactobacillus sp., Acinetobacter sp., Alcaligenes sp., and Methylobacterium sp. were recovered but were not detected at 8 days of fermentation. Initially, microbial diversity increased after 8 days of fermentation with 11 operational taxonomic units (OTUs), which further decreased to three OTUs at 30 days of fermentation. Aeromonas sp., Pseudomonas sp., and Klebsiella sp. dominated till 30 days of fermentation. The predominance of C-Proteobacteria and the presence of galloyl derivatives at the saturation stage of fermentation imply tannin degrading potential of these microbes. These studies confirm the role of different microbes from the initial stage to final stage of fermentation. Microbes play a key role in fermentation process which finally aids in conversion of carbohydrate sources into alcoholic production and transformation of phytoconstituents into therapeutics content.

Metabolic Engineering Yeast Strains

A Ray of Hope for cofermentation in ayurvedic treasures, jaggery is used as the carbohydrate source and Dhataki pushpa (W. fruticosa) as a fermenting agent, but nowadays, yeast S. cerevisiae is used for the production of ethanol in sandhana kalpana. Jaggery itself produces high concentration of sugar (approximately 30%) which is quite harmful for the diabetic patients. If jaggery is replaced by other carbohydrate sources which are having less glucose molecule then in final product least percentage of sugar produced (approximately 1%) with sufficient amount of ethanol. A number of feedstocks such as potato tuber, banana peel, wheat flour, cheese whey, and rice stalk and different feedstocks which include starch, cellulose, and hemicellulose need enzymatic reaction followed by fermentation and produce adequate amount of ethanol with least or no sugar percentage. Starch and cellulosic substrate required enzymatic process before fermentation to release sugar molecules from the substrate which is a very hectic and time-consuming process. Hence, direct fermentation from starch and cellulosic substrate can only be achieved by involvement of biotechnology. Collaboration of biotechnology with Ayurveda will help to provide engineered yeast, which can direct ferment the starch and cellulosic substrate for the production of self-generated alcohol in asava and arista preparation. In recent years, metabolic engineering of microorganisms used in ethanol production has shown significant progress. Besides, S. cerevisiae microorganisms such as Zymomonas mobilis and Escherichia coli have been targeted through metabolic engineering for cellulosic ethanol production. Recently, engineered yeasts have been described efficiently fermenting xylose and arabinose and even both together. Yeast cells are especially attractive for cellulosic ethanol processes because they have been used in biotechnology for hundreds of years, are tolerant to high ethanol and inhibitor concentrations and can grow at low pH values to reduce bacterial contamination. When mixed culture of mutant Schwanniomyces castellii and S. cerevisiae was used (US Patent 4769324 - Ethanol production), the S. castellii mutant produces the enzymes α-amylase and

glucoamylase which converts starch and higher sugars in the unfermentable component of the molasses substrate to a hexose sugar, thereby making it available for conversion to ethanol by S. cerevisiae. The mutant strain was acclimatized and able to produce amylases in a molasses containing medium. Hence, even though these are not used up in conversion process can be used as ancillary enzymes. The National Renewable Energy Laboratory produces mutant strain of Z. mobilis. The engineered Z. mobilis now produced ethanol from xylose and continuous to produce ethanol efficiently from glucose.

Quality Control Parameters For Asava and Arishta

1. Colour
2. Odour
3. pH
4. Specific gravity at 25°C
5. Boiling point
6. Refractive index
7. Optical rotation
8. Viscosity
9. Total solids
10. Alcohol content
12. Reducing sugar
13. Non- reducing sugar
14. TLC/HPTLC/GC-MS (any one or all)
15. Test for methanol
16. Total acidity
17. Test for heavy/toxic metals-Lead, Cadmium, Mercury, Arsenic
18. Pesticide residue-Organo chlorine pesticides, organ phosphorus pesticides, pyrethroids (Limits as per ASU Pharmacopoeia)
19. Microbial contamination-Total viable aerobic count, Enterobacteriaceae, Total fungal count (Limits as per ASU Pharmacopoeia)
20. Test for specific pathogen-Escherichia coli, Salmonella spp., Staphyloccocus aureus, Pseudomonas aeruginosa (Limits as per ASU Pharmacopoeia)
21. Aflatoxins (B1, B2, G1, G2) (Limits as per ASU Pharmacopoeia)
22. Shelf life

Pathya Kalpana

Introduction

The main aim of Ayurveda is स्वस्थस्य स्वास्थ्य रक्षणम् आतुरस्य विकारप्रशमनम्. To achieve the first aim wholesome food is essential. Our Acharyas explained DinAcharya, Ritucharya Sadvritta along with Pathya Ahara which has to be used daily and also the ahara to be followed as per the shadritu.

While explaining the importance of Pathya Ahara, our Acharyas mentioned पथ्ये सति गदार्थ्यस्य किमौशाध निशेवनै। पथ्ये असति गदार्थ्यस्य किमौशाध निशेवनै। This shows the importance of Pathya ahara both in Swastha and also for the diseased person.

Pathya Kalpana is also very much important during and after Panchakarma procedures. All our Acharyas had given equal importance to Chikitsa and Pathya.

Definition

पथ्यं पथोऽनपेतं यद्यच्चोक्तं मनसः प्रियम्। (Cha.Sam, Su.St. 25/45)

Here patha means the srotasas and Anapetha means do not causes damage to the srotasas. Hence Pathya means one which doesn't cause srotodusti and also pleases the manas. For this Chakrapani commented that one which maintains the health of healthy person and helps to cure the disease.

स्वस्थस्वास्थ्यरक्षणम् आतुरव्याधिपरिमोक्षश्चेति पन्था, तस्मादनपेतं पथ्यम्।।

(Cha.Sam. Su.St. 25/45, Chakrapanai)

Benifits of Pathayahara

तुष्टि पुष्टिर्धृतिर्बुद्धिरुत्साह पौरष बलम्। सौस्वर्य ओजस्तेजश्च जिवितं प्रतिभा प्रभा।।
आहारादेव जायन्ते एवमाद्या गुणा नृणाम्। तदात्मवान् हितमितं काले भुञ्जीत षड्रसम्।।

(Ka.Sam, Khi.St. 4/11-12)

The food which is Hita (wholesome), having six rasas consumed in proper quantity and proper time will provide Tushti (Contentment, Satisfaction), Pushti (Nutritive), Buddhi (Intellectual), Pourusha (Virility, Vigour), Bala (Strength), Souswarya (Melodious Voice), Oja (Virility, Strength) Tejas (Brightness of the Eye/Brilliance), Jivita (Life), Pratibha (Talent) and Prabha (Radiance).

Pathya Kalpana - Types

1. Manda, 2. Peya, 3. Yavagu, 4. Vilepi, 5. Krishara, 6. Khada Kambalika, 7. Raga-Shadava, 8. Veshavara, 9. Takra, 10, Katwara, 11. Dadhi kurcha, 12. Takra Kurcha. 13. Yusha. 14. Supa. 15. Mamsa Rasa 16. Veshavara.

Manda, Peya, Yavagu and Vilepi

सिक्थैर्विरहितो मण्डः पेयासिक्थसमन्विता। यवागुर्बहुसिक्था स्याद् विलेपि विरलद्रवा।।

(Su.Sam, Su.St. 46/344)

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The supernent liquid obtained after boiling the rice with water is called Manda.

नीरे चतुर्दशगुणे सिद्धोमण्डस्त्वसिक्थकः।। शुंठीसैन्धवसम्युक्तः पाचनो दीपनः परः तद्।

(Sha.Sam, Ma.Kha. 2/172)

The liquid obtained after boiling 1 Part of raw rice with 14 parts of water devoid of baked rice is Manda. If samskara done to this with shunthi choorna and saindhava lavana, it will be having deepana and pachana property.

मण्डस्तु दीपयत्यग्निं वातं चाप्यनुलोमयेत्। मृदूकरोति स्रोतांसि स्वेदं संजनयत्यपि।।
लङ्घिताना विरिक्तानां जीर्णे स्नेहे च तृष्यताम्। दीपनत्वाल्लघुत्वाच्च मण्डः स्यात्प्राणधारणः।।

(Cha.Sam, Su.St. 27/251-252)

It acts as Deepaka, Vatanulomana, Sroto Mrudukara. Sweda Samjanana. It nourishes the person who has undergone Langhana, Virechana, Sneha jeerna, Pipasita.

Astaguna Manda

धान्यत्रिकटुसिन्धूत्थमुद्गतण्डुलयोजतः।। भृष्टश्च हिङ्गुतैलाभ्यां समण्डोऽष्टगुणः स्मृतः।
दीपनः प्राणदो बस्तिशोधनो रक्तवर्धनः।। ज्वरजित्सर्वदोषघ्नो मण्डोऽष्टगुण उच्यते।

(Sha.Sam., Ma.Kha. 2/171-172)

Manda prepared from Dhanyaka, Trikatu, Saindhava lavana, Mudga, Tandula, Bhrista Hingu and Tilataila is known as Astaguna manda

Actions: Deepana, Pranada, Basti shodhana, Raktavardhana

Vatya Manda

सुकाण्डतैस्तथा भृष्टैर्वाव्यिमण्डो यवैर्भवेत्। कफपित्तहरः कण्ठ्योरक्तपित्तप्रसादनः।।

(Sha.Sam, Ma.Kha, 2/173)

Manda prepared out of fried broken rice is called Vatya Manda and it acts as Kaphapittahara, Kantya and Raktapitta Prasadana.

Laaja Manda

लाजैर्वा तण्डुलैर्भृष्टैर्लाजमण्डः प्रकीर्तितः। श्लेश्मपित्तहरो ग्राही पिपासाज्वरजिन्मतः।।

(Sha.Sam,Ma.Kha, 2/174)

Laaja (Puffed rice) or laaja prepared from fried rice acts as Kaphapittahara, Grahi, Pipasa and Jwarahara.

Yavagu

साध्यं चतुष्पलं द्रव्यं चतुःषष्टिपले जले। तत्क्वाथेनार्धशिष्टेन यवागूं साधयेद्धनाम्।।१५२।।

(Sha.Sam,Ma.Kha, 2/152)

Yavagu prepared from 4 palas of grains and 64 palas of jala and reduced it to half of original quantity.

आम्राम्रातकजम्बूत्वक्कषाये विपचेद् बुधः। यवागूं शलिभिर्युक्तां तां भुक्त्वा ग्रहणीं जयेत्।।

(Sha.Sam,Ma.Kha, 2/153)

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Yavagu prepared from the Kashaya prepared from the barks of Aamra, Amrataka and Jambu cures grahani.

Peya

द्रवाधिका स्वल्पसिक्थाचतुर्दशगुने जले। सिद्धा पेया बुधैज्ञेया यूषः किञ्चिद् घनस्ततः।। (Sha.Sam,Ma.Kha, 2/167)

Peya is the one which is prepared by boiling 1 pala of the drug with 14 palas of water in such a way that it should have more watery consistency.

पेया लघुतरा ज्ञेया ग्राहिणी धातुपुष्टिदा।। (Sha.Sam, Ma.Kha, 2/168)

Properties of Peya are: Light for digestion, useful in Grahini and it is Dhatupustikara.

Yusha

सिद्धा पेया बुधैर्ज्ञेया यूषः किंचिद्धन घनः स्मृतः। (Sha.Sam, Ma.Kha, 2/167)

Yusha is prepared with the same proportion of ingredients of peya in to thick consistency.

यूषो बल्यस्ततः कण्ठ्यो लघुपाकः कफापहः। (Sha.Sam, Ma.Kha, 2/168)

Yusha is Balya, Kantya and acts as Kaphahara.

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Vilepi

विलेपी घनसिक्था स्यात् सिद्धा नीरे चतुर्गुणे।। तर्पणी बृंहणी हृद्या मधुरा पित्तनाशिनी।।
(Sha.Sam,Ma.Kha, 2/166)

Vilepi is prepared by boiling 1 part of grains with 4 parts of water to make thick consistency. It acts as Tarpana, Brimhana, Hridya, Madhura and Pittanashaka.

Anna Kalpana

Synonyms

भक्तं मन्नं तथाऽन्धश्चक्वचित्कूरंचकीर्तितम्। ओदनोऽस्त्रीक्लियांभिस्सादीदिविः पुंसिभाषितः।।

Bhakta, Andha, Kura, Odana, Bhissa, Didivi are the synonyms of Anna.

Method of Preparation

सुधौतांस्तण्डुलान् स्फीतांस्तोये पञ्चगुणे पचेत्। तदुक्तं प्रस्रुतं चोष्णं विशदं गुणवन्मतम्।।
भक्तं वह्निकरं पथ्यं तर्पणं रोचनं लघु। अधौतमस्रुतं शीतं गुर्वरुच्यं कफप्रदम्।। (B. P, Kritannavarga)

These shlokas explaining about the preparation of Anna Kalpana. One part of tandula has to be cleaned three to four times with water and mixed with five times of water in a vessel and cooked on covering the lid. The lid should be covered till the appearance of foam and should be removed later. The vessel is taken out when rice is properly cooked and then the liquid is filtered through a cloth. Anna prepared by this method, if taken in its warm state will be beneficial. It stimulates the digestion, Nutritious, Nourishing, increases the taste and light for digestion, whereas Anna which is adhauta, aprasrita and cold is heavy for digestion, not tasty and increases Kapha.

According to Sharangadhara Samhita

जले चतुर्दशगुणे तण्डुलानां चतुष्पलम्।। विपचेत्स्रावयेन्मण्डं स भक्तो मधुरो लघुः।

(Sha.Sam,Ma.Kha, 2/169)

Four palas of rice boiled with 14 parts of water until the rice cook properly and filter the supernatant liquid and the resultant rice is called Anna.

अन्नं चतुर्गुणे तोय। (Su.Sam, Su. St, 46/344, Dalhana teeka)

Anna is prepared by boiling 1 part of Rice with 4 parts of water until the rice is appropriately cooked. Then liquid part is removed and rice part used as Anna.

Properties

धौतस्तु विमलः शुद्धो मनोज्ञः सुरभिः समः।
स्विन्नः सुप्रस्रुतस्तूष्णो विशदस्त्वोदनो लघुः।।
अधौतोऽप्रस्रुतोऽस्विन्नः शीतश्चाप्योदनो गुरुः।। (Su.Sam, Su. St, 46/346-347)

Odana prepared with well washed rice will be clean and pleasing with good odour. The proper boiled and accordingly prepared odana is laghu for digestion.

Odana prepared with unwashed rice will be non-pleasing with disagreeable odour. Rice will not boil properly and it becomes Guru for digestion.

Krishara

तण्डुलाशालिसम्मिश्रा लवणार्द्रकहिंगुभिः। संयुक्ताः सलिले सिद्धदा कृशरा कथिता बुधैः।।

(B. P, Kritannavarga)

Tandula, Mudgha, Lavana, Ardraka, Hingu and water are added and cooked to prepare Krishara. Usually 1 part of Tandula, ¼th part of Mudga, 6 parts of water with little quantity of Lavana, Ardraka and Hingu are taken for the preparation of krishara.

Guna and Karma

कृशरा शुक्रला बल्या गुरुः पित्तकफप्रदा। दुर्जरा बुद्धिविष्टम्भिमलमूत्रकरी स्मृता।। (B. P, Kritannavarga)

कफपित्तकरी बल्या कृशराऽनिलनाशनी। (Su.Sam, Su. St, 46 /346)

Krishara is shukrala, Balya. Guru, Kaphapittakara, Vatahara, Durjara (difficult for digestion), Buddhi vishtambi, Mala-Mutrakari.

Khada and Kambalika

कफपित्तकरी बल्या कृशराऽनिलनाशनी। (Su.Sam, Su.St, 46/376)

Khada and Kambalika are the varieties of Yusha. There are two types of Khada

1. Khada prepared from sataka shamidhanya.
2. Khada prepared from sataka shaka.

Preparation Method of Satakra Shamidhanya Khada

सतक्राणि शमीधान्यानि स्निग्धानि-संग्राहकाणिखडानि। (Su.Sam, Su.St, Dalhana)

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Ingredients

Takra -1 part

Nistusha Shami dhanya- 1/16 Part.

These ingredients are taken in an Earthen vessel and subjected for heating process untill it reducesto ½ or ¼th part and after cooling Ghrita bharjita Jeeraka and Maricha should be added. This preparation is called Sataka Shamidhanya Khada.

Preparation Method of Satakra Shakha Khada

कपित्थतक्रचांगेरीमरिचाजाजिचित्रकैः। सुपक्वः खडयूषोऽयम्। (Su.Sam, Su. St, Dalhana)

Ingredients

Takra -1 Part

Kapittha, Changeri, Maricha, Jeeraka and Chitraka -each 1/16th part are taken in an earthen vessel and boiled over mandagni until it reduces to half. This preparation is called Satakra Shakha Khada.

Preparation of Kambalika

काम्बलिकोऽपरः। दध्यम्ललवण स्नेह तिलमाष समन्वित;।। (Su.Sam, Su. St, Dalhana)

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Ingredients

Dadhi- 1 Part

Tila or Masha, Lavana and Sneha each 1/16th part

The Yusha prepared out of these dravyas is called Kambalika.

Kambalika is also prepared in another method also. 1 part of Dadhimstu and 1/16th part of dehusked mudga or Masha boiled to reduce half. Then add Sauvarchala Lavana, Jiraka, Bijapura Nimba, Ela, Lavanga Jatiphala and Nagakesara. Sugandha dravyas can also be added and churned well. This preparation is called Kambalika.

Guna and Karma of Khada and Kambalika

खडकाम्बलिको हृद्यौ तथावातकफे हतौ। बल्यः कफानिलौ हन्तिदाडिमाम्लोऽग्निदीपनः।।
दध्यम्लः कफकृद्बल्यः स्निग्धो वातहरो गुरुः। तक्रम्लः पित्तकृत्प्रोक्तो विषरक्तप्रदूषणः।।

(Su.Sam, Su.St, 46/376-377)

दाडिमेन क्रियते योऽम्लो यूषः सदाडिमाम्लः। दध्यम्ल इति दध्ना क्रियतेयोऽम्लो यूषः स दध्यम्ल;।।
तक्राम्लोऽप्येवम्। दाडिम धान्याम्लदधितक्रैरम्लत्वं काम्बलिकस्यैव इत्येके। (Dalhana)

Khada and Kambalika are Hridya, Vatakapha-hara,

Dadimamla Kambalika- Agnideepana, balya, kaphavatahara.

Amla dadhi Kambalika- Kapha Vardhaka, balya, snidgha, Vatahara, guru

Takramla-Pittakara, Rakta Pradooshaka, Vishavardhaka

Raga

सितारुचकसिन्धुत्थैः सवृक्षाम्लपरूषकः। जम्बूफलरसैर्युक्तो रागो राजिकयाकृतः।। (Su.Sam, Su.St, 46/383)

Ingredients: Sita, Sauvarchala, Saindhava Lavana, Vrukshamla, Parushaka swarasa, Jambu Phala swarasa, and Jeeraka

First Sita, Sauvarchala lavana, Saindhava, lavana, Vrukshmala, swarasa, Parushaka swarasa, Jambu Swarasa all are mixed and grind well and little quantity of Jeeraka is added this preparation is called Raga.

Shadava

स्पष्टाम्लमधुरोऽस्पष्ट कषायलवणोषणः। अतिक्तः खाडवः कोल कपित्थाद्यु-पबृंहितः।।

(Su.Sam, Su.St, 46/378)

षाडवाःपुनर्मधुराम्ललवणसंयोगजा नानाविधाः। (Su.Sam, Su.St, 46/383)

Shadava can be prepared from Unripened Amra, Kapitta, Kola and Matulunga.

Shadava can also be prepared by Madhura amla, lavana rasa dravyas.

Gutuka Shadava

कपित्थकाम्राणिं सदाडिमानि पिष्टानि सूक्ष्मंसितया युतानि।
सबीजपूराम्बुविभावितानि सन्तर्पणोऽयं गुटिकाख्यखाडव;।। (Gada Nigraha, Vajikarana Adhyaya 105)

Kapitta, Amra, Dadima etc fruits are mixed together and grind with equal quantity of sita then add Bijapura swarasa and rolled in to vati form. This is called Gutika Shadava and it acts as Santarpana.

Raga Shadava

आममाम्रं त्वचाहीनं द्विस्त्रिर्वा खण्डितं ततः। सुपक्वं च समुत्तार्य मरिचैलेन्दुवासितम्।
स्थापितं स्निग्धमृद्भाण्डे रागषाडवसंज्ञितः।। (Vai.Sha. Si)

Twacha heena Apakwa Amra made in to 3 to 4 pieces and subjected to bake on mandagni. Then add Prakshepaka dravyas like maricha churna and Karpura and mix thoroughly. This preparation is known as Raga shadava. This has to be preserved in a vessel coated with Ghee.

Guna and Karma of Raga Shadava

रुचिष्यो लघुपाकश्च दोषाणां चाविरोधकृत।। (Su.Sam, Su.St, 46 /368)

लघवो बृंहणा वृष्या हृद्या रोचनदीपनाः। तृष्णामूर्च्छाभ्रमच्छर्दिश्रमघ्ना रागषाडवाः। (Su.Sam, Su.St, 46/383)

कट्वम्लस्वादुलवणा लघवो रागषाडवाः। मुखप्रियाश्च हृद्याश्च दीपनो भक्तरोचनाः।। (Su.Sam, Su.St, 27/281)

Ruchya, lagupaki, Brihmana, Hridya, deepana, trishnahara, murchahara, bhramahara, chardihara, shramahara.

CHAPTER SEVEN

Veshavara

मांसं निरस्थि सुस्विन्नं पुनर्दृषदि पेषितम्। पिप्पली शुण्ठिमरिचगुडसर्पिः समन्वितम्।।
ऐकध्यं पाचयेत्सम्यग्वेसवारइतिस्मृतः। वेसवारो गुरुः स्निग्धो बल्या वातरुजापहः।। (Su.Sam, Su.St, 46/369-370)

Boneless meat of Goat or Sheep is subjected to swedana and then it is made into paste, add pippali, shunthi, maricha guda and Sarpi and again subject it to heat. This is called as Veshavara.

Guna and Karma

Guru, Snigdha, Balya and Vatarogahara

Takra Kalpana

Takra Kalpana is one of the important Pathya Kalpana. Takra is considered as Amruta for human beings living in this earth which is not available in the devaloka.

Types of Takra

रूक्षमर्धोद्धृतस्नेहं यतश्चानुद्धृतं घृतम्। तक्रं दोषाग्निबलवित्रविधं तत्प्रयोजयेत्।। (Cha. Sam, Chi.St, 14/84)

Charaka Mentioned three types of Takra based on the presence of Sneha in Takra

1. Ruksha Takra in which Sneha is completely removed means Navaneetha is completely taken out.
2. Ardhodhruta Sneha Takra in which half of the Sneha is taken out.
3. Anudhruta Sneha Takra in which Sneha is not removed.

According to Bhavaprakasha, there are five types of Takra.

घोलं तु मथितं तक्र मुदश्चिच्छच्छिकाऽपि च। (B.P. Takravarga)

1. Ghola 2. Mathita, 3. Takra, 4. Udashwitha and 5. Cacchika

Ghola

ससरं निर्जलं घोलं। (B.P. Takravarga)

युत्त सस्नेहमजलं मथित घोलमुच्यते।। (Su.Sam, Su.St, 45/85)

Takra is prepared by churning Dadhi without adding water.

Guna and Karma

घोलं तु शर्करायुक्तं गुणैर्गेयं रससालवत्। वातपित्तहरं ह्लादि.....। (B.P. Takravarga)

If Gola is taken along with sugar, it will be having guna like Rasala. Gola is vatapitta-hara, Ahladakara,

Mathita

मथितं त्वसरोदकम्।। (B.P. Takravarga)

मथितं कफपित्तनुत्.....। (B.P. Takravarga)

CHAPTER SEVEN

Takra is prepared by churning without adding water and Sneha is taken out. It is Kaphapitthara.

Takra

तक्रं पादजलं प्रोक्तम। (B.P. Takravarga)

Takra is prepared by churning Dadhi with ¼th quantity of water and Sneha is separated.

Udashwitha

उदश्वित्त्वर्धवारिकम्। (B.P. Takravarga)

उदश्वित्कफकृद्ग ल्यमामघ्नं परमं मतम्। (B.P. Takravarga)

Takra is prepared by churning Dadhi with half of water and Sneha is not separated.

Guna and Karma

It is Kaphakara, balya and amahara

Chacchika

छच्छिका सारहीना स्यात्स्वच्छा प्रचुरवाकिा।। २।। (B.P. Takravarga)

छच्छिका शीतला लघ्वी पित्तश्रमतृषाहरी। वातुनुत्कफकृत्सा तु दीपनीलवणान्विता।। (B.P. Takravarga)

Takra is prepared churning Dadhi with large quantity of water and Sneha is separated.

Guna and Karma

तर्क तु मधुरमम्लं कषायानुरसमुष्णवीर्य लघुरुक्षमग्निदीपनं गरशोफातिसारग्रहणीपाण्डुरोगर्शः। प्लीहगुल्मारोच-मविषमज्वरतृष्णाच्छर्दिप्रसेकशूलभेजः श्लेष्मानिलहरंमधुरविपाकंहृद्यंमूत्रकृच्छ्रस्नेहव्यापत्प्रशमनमवृष्यंच।

(Su.Sam, Su.St, 45/84)

शोफार्शी ग्रहणीदोषमूत्रग्रहोदरारुचौ। स्नेहव्यापदि पाण्डुत्वे तक्रंदद्याद्गरेषुच।। (Cha.Sam, Su.St, 27/229)

वातश्लेष्मविकाराणां शतं चापिनिवर्तते। नास्ति तक्रात्परं किञ्चिदौषधंकफवातजे।। (Cha.Sam, Chi.St, 14/88)

Chacchika is sheeta, Laghu, Pittahara, Shramahara, Trishnahara, Vatahara, Kaphakara, acts as Deepaka if administered with lavana.

Guna and Karma of Takra

Rasa	-	Madhura, Amla, Kashaya
Guna	-	Laghu, Rooksha,
Virya	-	Ushna
Vipaka	-	Madhura
Doshaghnata	-	Kaphavatahara
Karm	-	Deepana, Grahi

Rogaghnata - Shopha, Gara, Atisara, Grahani, Pandu, Arsha, Pleeha, Gulma, Arochaka, Vishama jwara, Trishna, chhardi, Praseka, Shoola, Mutrakriccha, Mutragraha, udara

Contraindications of Takra

नैवतक्रं क्षते दद्यान्नोष्णकालेन दुर्बले। न मूर्च्छाभ्रमदाहेषु न रोगे रक्तपैत्तिके।। (Su.Sam, Su.St, 45/86)

Takra should not be administered to persons suffering from Kshata, durbala, Murcha, Bhrama, Daha and Raktapitta. It should not be administered during Ushna Kala.

Indications of Takra

शीतकालेऽग्निमान्द्ये चकफोत्थेष्वामयेषुच। मार्गविरोधे दुष्टे च वायौ तक्रं प्रशस्यते।। (Su.Sam, Su.St, 45/87)

Takra is indicated in persons suffering from Agnimandya, Kaphaja rogas, Margavarodha, vata vikaras. It can be administrated during Sheeta Kala.

Takra Prayoga in Rogas Based on Doshas

वातेऽम्लं सैन्धवोपेतं, स्वादु पित्ते सशर्करम्। पिबेत्तक्रं कफे चापि व्योषक्षारसमन्वितम्।। (Su.Sam, Su.St, 45/89)

S.No.	Diseases	Takra Prayoga
1	Vataja Vikaras	Amla Takra with Saindhava Lavana
2	Pittaja Vikaras	Madhura Takra with Sharkara
3	Kaphaja Vikaras	Takra with Trikatu and Yavakshara

Katwara

दध्नः ससारकस्यात्र तक्रं कट्वरमिष्यते। तक्रं ह्युदश्विन्मथितं पादाम्ब्बर्धाम्बु निर्जलम्।। (Vai. Pa. Pra)

It is prepared by churning Dadhi with ¼th or ½ or without adding water and Sneha should be taken out.

Dadhi Kurchika

दध्ना सह पयः पक्वं स भवेद्धधिकूर्चिका।। (Vai. Pa. Pra)

Dadhi is boiled with ksheera until it attains semisolid consistency is called as Dadhikurchika.

Takra Kurchika

तक्रेण पक्वं यत्क्षीरं सा भवेत्तक्रकूर्चिका।। (Vai. Pa. Pra)

Takra is boiled with Ksheera until it attains a semisolid consistency is called Takra Kurchika.

Research Updates

1. Dr. Aparna. S. et al, **A Comparative Clinical Study to Evaluate the Efficacy of Mulaka Yusha and Kulatha Yusha in Sthaulya W.S. R to Obesity,** WJPR, Vol 10, Issue 14, 988-1004

Mulaka Yusha acts as primary prevention as well as secondary prevention in Sthaulya/obesity.

2. Sangeetha D More et. al, **A clinical study of Panchakola Siddha Yavagu in the management of Agnimandya,** AYU, Jan -Mar 2011, Vol 32, issue 1, 70-75.

Panchakola Siddha Yavagu (Group A) shows highly significant results in the patients of Agnimandya and simple Yavagu also shows the same improvement as in Group A.

3. Neeraj Kumar Joshi et al, **A clinical assessment of the effect of pathya ahara in (diabetes mellitus),** IAMJ, Volume 3; Issue 1; January -2015

Madhumeha (Diabetes Mellitus) can be prevented if intervention in the form of Pathya Ahara is applied in early stage, either prediabetes healthy state. Food article beneficial in Madhumeha specially powder of Bhrista Chanaka improves digestive power, and restores the normal physiology of body tissues. The use of food items which are Kapha-vataharais an important underlying principle in the prevention of Madhumeha. This study proves that specific diet maintains the normalcy of blood glucose level. People at risk should be educated about this scientific fact and advised to follow it at the earliest, for better prevention of Madhumeha (Diabetes Mellitus).

Dietary Supplements and Neutraceuticals

A dietary supplement is a diet manufactured in the form of a pill, capsule, tablet powder or liquid. These supplements provide nutrients which is extracted from food sources or prepared synthetically to enhance the quantity of their consumption.

These nutrients include vitamins, minerals, fibers, fatty acids, and amino acids. Dietary supplements may also contain substances that are not considered essential to life, but they have beneficial effects like Plant pigments or polyphenols. Sometimes even animals are also the source of supplements like collagen from chicken. These animal products may be sold individually or in combination or combined with nutrient ingredients.

Nutraceuticals

Nutraceuticals are any product derived from food sources with extra health benefits in addition to the basic nutritional value found in foods.

The term "nutraceutical" has two words "nutrient," which is a nourishing food component, and "pharmaceutical," which is a medical drug. The name was coined by Stephen De Felice, in 1989 founder and chairman of the Foundation for Innovation in Medicine, which is an American organization located in Cranford, New Jersey.

The main idea behind nutraceuticals is to focus on prevention. Hippocrates (known as the father of medicine) said "let food be your medicine". Their role in human nutrition

is one of the most important areas of investigation, with wide-ranging implications for consumers, healthcare providers, regulators, food producers, and distributors.

Types of Neutraceuticals

There are 4 types of Neutraceuticals– 1. Dietary supplements, 2. Functional food, 3. Medicinal food 4. Farmaceuticals.

Functional Supplements

Functional foods are highly nutritious and associated with a number of powerful health benefits. For example, they may protect against disease, prevent nutrient deficiencies, and promote proper growth and development. **Examples:**

1. Foods fortified with vitamins, minerals, probiotics, or fibre. Nutrient-rich ingredients like fruits, vegetables, nuts, seeds, and grains are often considered functional foods as well.
2. Oats, contain a type of fibre called beta-glucan, which has been shown to reduce inflammation, enhance immune function, and improve heart health.
3. Fruits and vegetables have antioxidants, which are beneficial compounds that help to protect against disease.

Medicinal Food

Medical foods are foods that are specially formulated and intended for the dietary management of a disease that has distinctive nutritional needs that cannot be met by a normal diet alone. **Examples:** Ginger, Turmeric, Mushroom, Custard Apple, Papaya, Moringa Leaves and Licorice root

Farmaceuticals

A medically valuable compound produced from modified agricultural crops or animals (usually through biotechnology).

Discussion

There are two types of preparations we can see in Ayurvedic Pharmaceutics **1.** Primary Preparation and **2.** Secondary preparation. Primary preparation is nothing but Panchavidha Kashaya Kalpana and the remaining preparations come under Secondary preparation prepared by using one or two primary preparations, Sneha Kalpana is the pharmaceutical preparation from fat and fatty materials useful for both internal and external use. Ghrita is widely used for internal use and Taila is used widely for external use. Sandhana Kalpana is mainly intended to enhance the shelf life of Swarasa, Kashaya, Hima, and Phanta by self-generated alcohol. Apart from this due to alcohol, we can expect quicker action of the drug. Pathya Kalpana is a unique preparation of Ayurvedic Preparation intended for the Maintenance of health and also during the treatment.

Conclusion

Sneha Kalpana, Sandhana Kalpana are the secondary preparations intended to get the double benefit of drugs and Sneha together and quicker action of the drugs Pathya Kalpana is unique to Ayurveda and of equal importance given to food like medicine.

Extended Learning

Basic principles involved, processing techniques, Research updates, essential knowlege of sale and clinical practice and Market survey of Avaleha kalpana, Sneha kalpana, Sandhana kalpana and Pathya kalpana.

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MODEL QUESTIONS

Avaleha Kalpana

Long Answers

- Write in detail about the general method of preparation of Avaleha & write the manufacturing of Vasavaleha.
- Define Avaleha. Describe the method of manufacturing method of Avaleha, Siddhi lakshana, Dose and Anupana.
- Describe avaleha siddha lakshanas & write the ingredients, dose & uses of Kushmandavaleha.

Short Answers

- Essential Ingredients of Avaleha.
- Avaleha Siddha Lakshana
- Vasavaleha
- Kushmandavaleha

Sneha Kalpana

Long Answers

- Define 'Sneha Kalpana'. Explain Sneha-murchana, Sneha-paka vidhi, Sneha- siddhi Lakshanas in detail.
- Write the definition of Sneha Kalpana and mention types of Sneha,
- Explain Sneha murcchana, Sneha paka vidhi, and Sneha siddhi Lakshana in detail.
- What are the main components used for preparing Sneha? Write about the Sneha pakas with Sneha siddhi lakshana and uses.
- Write the method of preparation, ingredients, therapeutic dose, and therapeutic uses anupana, shelf-life, storage, and preservation of Phala Ghrita.
- Write method of preparation, ingredients, therapeutic dose, therapeutic uses anupana, shelf-life, storage and preservation of Ksheerabala Taila.

Short Answers

- Explain Sneha-murcchana
- Write importance of Sneha-paka kalpana
- Write the importance of Ghee
- Write the importance of Tila taila
- Explain Sneha-paka vidhi
- Explain Sneha-siddhi Lakshanas

- Explain Taila-murcchana
- Explain Ghrita-murcchana
- Explain Sneha-paatra paka
- Explain Bhanupaka
- Define 'Sneha Kalpana'.
- Write the importance of Sneha-murcchana
- Explain the types of Sneha
- Write the basic components required for Sneha-Paka Kalpana.
- Write the ingredients required for Taila-murcchana.
- Write the ingredients required for Ghrita-murcchana
- Write the ingredients of Phala Ghrita
- Write the ingredients of Ksheerabala tailam
- Write uses of Phala Ghrita
- Write uses of Ksheerabala tailam

Sandhana Kalpana

Long Answers

- Define 'Sandhana Kalpana' and write the main components, method of preparation, confirmatory tests, general dose, storage, and preservation of Asava-Arishta.
- Define Madya? Explain the ingredients, method of preparation, Siddha Lakshana, therapeutic uses, and dose of Drakshaarishta.
- Mention ingredients, method of preparation, therapeutic uses, dose, and anupana of Usheerasava

Short Answers

- Write the difference between Asava and Arishta.
- Write the importance of Sandhana Kalpana.
- Define Madya. Write its properties.
- Difference between Madya and Shukta Kalpana
- Sandhana Siddha Lakshana
- Write definition of 'Sandhana Kalpana'.
- Write the classification of Sandhana Kalpana
- Write therapeutic dose
- Shelf-life and anupana of Asava-Arishta
- What is Prasanna?

- What is Kaadambari?
- What is Medaka?
- What is Jagala?
- What is Bakkasa?
- Write 2 uses of Draakshaarishta.
- Write 2uses of Usheerasava
- Lime Water Test
- Sandhan Asanna Lakshana

Pathya Kalpana

Long Answers

- Write the definition of 'Pathya Kalpana 'and explain its importance in Swasttha and Rogi.
- Define Pathya and Apathya. Explain these with proper examples.
- Write the concept of Pathya Ahara and explain its role concerning modern Nutraceutical sciences.
- Define Kritanna and explain its different types in detail.

Short Answers

- Define 'Kritanna Kalpana' and write its uses
- Short note on Aushadhisiddha Anna
- Concept of Pathya Ahara
- Explain about Yusha
- Explain about Yavaagu
- Write about Bhakta Kalpana
- Write about Anna Kalpana
- Write about Odan
- Write about Krishara
- Write about Mamsa rasa
- Write about Vesavara
- Difference between Yusha and Yavaagu
- Difference between Peya and Vilepi
- Difference between Khada and Kaambalika
- Difference between Raaga and Shaadava

- Write the uses of 'Yavaagu' in brief.
- Write the uses of 'Yusha' in brief.
- Define 'Manda' and its uses
- Write the uses of 'Mamsa rasa'
- Write the uses of 'Veshvaara'
- Veshvaara and Mamsa rasa
- Vilepi and Peyaa
- Manda and Yavaagu
- Yusha
- Khada and Kaambalika
- Raaga and Shaadava
- Types of Takra

CHAPTER 8

RASA DRAVYA PARICHAYA – I

PAPER 1

Contents

Synonyms, minerological identification, sources, types, grahya and agrahyata, doshas, shodhana, marana and other processing techniques, Probable Physico-chemical Changes, importance of temperature while processing, yoga, Research updates of

Parada (mercury), Abhraka (Biotite Mica), Makshika (Chalco-pyrite), Shilajatu (Asphaltum Punjabianum), Gandhaka (Sulfur), Gairika (Red Ochre), Kankshi (Alum), Haratala (Orpiment), Manahshila (Realgar), Kampillaka (Mallotus Philippinensis), Navasadara (Ammonium chloride), Hingula (Red Cinnabar), Swarna (Gold), Rajata (Silver), Tamra (Copper), Loha (Iron), Mandura (rust iron), Vanga (Tin), Naga (Lead), Yashada (Zinc), Mukta (Pearl), Pravala (Coral), Vajra (Diamond), Kaparda (Cowries), Shukti (Oyster Shell), Shankha (Conch Shell), Godanti (Gypsum), Samudraphena (Cattle Fish bone), Kukkutanda twak (Hen's Egg Shell), Tankana kshara (Borax).

Learning outcome

At the end of this chapter, Students can able to

1. Explain classical & Mineralogical identification and Sources of Rasa-dravyas.
2. Discriminate types, Grahya-Agrahyata and Dosha of Rasadravya.
3. Explain Shodhana and Marana and other processing techniques of the Rasa-dravya.
4. Enlist Kalpas prepared from these Rasdravyas and therapeutic importance of that Rasadravya.

Parada (Mercury)

Introduction

Parada is the core element of the Rasashastra. It is the most important and foremost ingredient of compounds of Rasashastra. It is the base for the science of Alchemy-Rasashastra perhaps without which the science would have not existed. Considering Parada to be semen of Lord Shiva which was thrown on earth at various places, during the creative conjunction between Lord Shiva and Godess Parvati mythlogically, adds more to its importance. Since it is considered as the veerya of Lord Shiva, Parada is said to be so divine that it destroys diseases, old age and even death.

Synonyms

रसो रसेन्द्रः सूतश्च रसेशश्च रसेश्वरः। चपलो रसराजश्च पारदश्च शिवाह्वयः।। (R.T.5/1)

Parada has been called by different names based on its quality in different Rasa classics.

These can be summarized as below:

S.No.	Factors	Synonyms
1	Swarupatmaka	Galadroupyanibham, Mahavahni, Mahateja, Suvarna
2	Gatyatmaka	Khechara, Chapala, Chanchala, Chala, Dhoorthaka.
3	Dehavadatmaka	Rasayana, Amrutam, Mrtyunasana, Jaiva, Dehada, Paramamruta, Parata, Parada, Rasayana Shreshta
4	Dhatuvadatmaka	Rasa, Rasendra, Maharasa, Rasottama, Suta, Divyarasa, Raseshwara, Rasesha, Rasadhatu, Rasaraja, Rasanatha, Rasaloha, Siddhadhatu, Soota, Sootaka, Sootaratha, Sootaraja, Sootendra, Mishraka, Chamara.
5	Visista Gunatmaka	Ananta, Suksma, Saubhagya, Amara, Paavana, Kalikantaka.
6	Darshanika/Aadhyatmika	Divya, Achintya, Jeeva, Jaiva, Jnanam, Jaitra.
7	Dharmika/Devatmaka	Trinetra, Trilochana, Deva, Dehaja, Divya, Dehada, Prabhu, Rudraja, Rudrateja, Lokanatha, Lokesha, Vijendra, Budha, Rajaswala, Shanta, Shiva, Indra, Shivaveerya, Skandha, Haraja, Harateja, Harabeeja, Shivahaya, Shivabeeja, Skanda, Shivateja, Bheejendra, Bhava, Mukunda, Shambuja, Skandesha.

Nirukti

There are 5 most important synonyms of Parada. These are also considered as types of Parada. They are:

1. Rasa
2. Rasendra
3. Soota
4. Parada
5. Mishraka

1. Rasa

रसनात्सर्वधातुनां रस इत्यभिधीयते।
जरारुङ्मृत्युनाशाय रस्यते वा रसो मतः ।। (R.R.S.1/76)

It is called Rasa since it can engulfs all the metals and minerals like Swarna, Abhraka etc. Also, it is called Rasa, as it is capable of eradicating jara (senility), rukh (diseases) and mrutyu (Death).

2. Rasendra

रसोपरसराजत्वाद्रसेन्द्र इति कीर्तितः। (R.R.S.1/77)

It is called Rasendra because it is supreme among all the rasa, uparasa and the rasa dravyas.

3. Soota

देहलोहमयीं सिद्धिं सूतो सूतस्ततः स्मृतः।। (R.R.S.1/77)

It has been termed as soota as it brings about the Dehasiddhi (making the body strong and disease free) and Lohasiddhi (converting lower metals into noble metals like Gold and Silver)

4. Parada

रोगपङ्काब्धिमग्नानां पारदानाच्च पारदः। (R.R.S.1/78)

Since it rescues the persons who is trapped in the swamp of diseases and make them healthy, it is known as Parada.

5. Mishraka

सर्वधातुगतं तेजोमिश्रितं यत्र तिष्ठति।। तस्मात्स मिश्रकः प्रोक्तो नानारूपफलप्रदः।
मयूरचन्द्रिकाछायः सरसो मिश्रको मतः। सोऽप्यद्रशसंस्कारयुक्तश्चातीव सिद्धिदः।। (R.R.S.1/78-79)

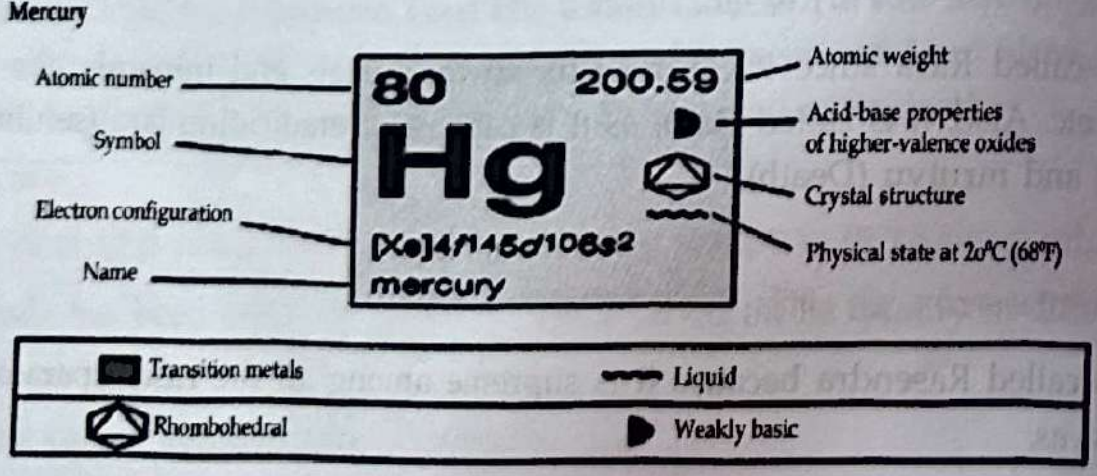
It is named as mishraka, because it has the lustre and essence of all the metals and minerals concentrated within it. Because of this reason, it bestows different therapeutic benefits.

Vernacular Names

Sanskrit	:	Parada
Hindi	:	Paara
English	:	Mercury, Quick silver.
Kannada	:	Paadarasa.

Minerological Identification

Mercury is a silvery white metal, liquid at room temperature with high (13.6) density. It is divisible into spherical globules, mobile, without having any odour/taste, cold to touch, slowly volatizing at ordinary temperature. Low melting and boiling point is due to large atomic size. The metallic shine of mercury is due to the presence of free electrons with a high plasma frequency. It is soluble in nitric acid and in boiling sulphuric acid.



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Atomic Number	:	80
Relative Atomic Mass	:	200.50 gm/mole
Atomic Weight	:	200.61
Atomic Volume	:	14.8CC
Ionic Radius (+2)	:	1.10

Chemical Composition	Hg
Colour	Tin white, Gray white
Luster	Metallic
Crystal habit	Trigonal - Hexagonal Scalenohedral
Cleavage	None
Specific Gravity (gm/cmu)	13.55
Diaphaneity	Opaque
Hardness (Moh's Scale)	0 – Liquid
Fracture	None
Streak	None
Melting point	-38.8°C
Boiling point	357°C

Sources and Occurrence

In Rasaratna Samucchaya, it is mentioned that in ancient times Mercury was found mainly in Darada desha and also in Himalayas in small amount. But now a day, it is obtained mainly near the volcanic hills or hot springs. The mines of Mecury are found in Spain, America, Italy, South Africa, Europe, Australia, British, China, Russia, Germany and Japan. Mercury occurs in 2 forms.

1. Native form and 2. Ore form

Mercury is found extremely rare in its native form. Generally mercury is found in the form of ores, the most important are Cinnabar (Hgs) and Metacinnabar (Hgs), which are in sulphide forms. Other ores are Calomel (Hg_2Cl_2), Living stonite of mercury.

Hingulottha Parada

Hingula is the main ore of Parada. The process of extracting parada from its ore Cinnabar or Hingula is called as Hingulottha parada. The parada extracted from Hingula is said to be pure, free from sapta kanchuka doshas and it is said to be Shreshta. It is said to be equal to Asta samskarita Parada.

Methods Employed

- Urdhwapatana Vidhi
- Tiryak Patana Vidhi
- Adhahpatana Vidhi

Yantras Used for the Extraction of Parada are : –

- Urdhwapatana Yantra
- Adhahpatana Yantra
- Tiryakpatana Yantra
- Vidyadhara Yantra
- Damaru Yantra.
- Nada Yantra

Procedure

हिङ्गुलं पारिभद्रस्य रसैः सम्पेषयेद् बुधः। चाङ्गेर्या वा रसेनैव द्रवैर्जम्बीरजैस्तथा।।
ऊर्ध्वपातनयन्त्रेण सप्तकञ्चुकवर्जितम्। गृह्णीयान्निर्मलं सूतं रसतन्त्रविशारदः।। (R.T.5/38-39)

Method

1. Fine powder of Hingula or the chakrika of shodhita Hingula is prepared by giving bhavana with Paribhadra rasa or Changeri rasa or Nimbu rasa.
2. This is placed in Damaru yantra or Patana yantra.
3. After proper sandhibandhana, this is subjected to heat on mandagni.
4. The upper pot is kept cool by continuous flow of cold water.
5. After giving heat for required time, it is allowed to self cool.
6. Later sandhibandhana is removed and soot mixed with Parada collected from the inner surface of the upper pot.
7. This is filtered through 4 layered cloth, to collect shuddha Parada.
8. In case of Adhapatana yantra, paste of Hingula is applied to the inner surface of the upper pot and parada collected from lower pot.
9. This Hingulottha parada is pure and devoid of Sapta kanchuka doshas.

Hingulottha Parada Samanya Shodhana

षोडशांशे निशाचूर्णे ततस्तं पेषयेद् बुधः। अम्लेन पटुना चापि मर्दयेद्वा दिनद्वयम्।। (R.T.5/40)

Hingulottha Parada is subjected to trituration for 2 days with $\frac{1}{16}^{th}$ part of Haridra churna or lavana by adding required amount of Nimbu rasa. Later it is washed with water and can be used for further processing.

Types of Parada

The Varieties of Parada has been described in various texts:

Depending on the Kshetra

रसो रसेन्द्रः सूतश्च पारदो मिश्रकस्तथा। इति पञ्चविधो जातः क्षेत्रभेदेन शंभुजः।।
रसो रक्तो विनिर्मुक्तः सर्वदोषै रसायनः। सञ्जातखिदशास्तेन नीरुजा निर्जरामराः।।
रसेन्द्रो दोषनिर्मुक्तः श्यावो रूक्षोऽतिचञ्चलः। रसायिनोऽभवंस्तेन नागा मृत्युजरोज्झिताः।।

देवैर्नागैश्च तौ कूपौ पूरितौ मृन्धिरश्मभिः। तदा प्रभृति लोकानां तौ जातावतिदुर्लभौ।।
इक्षीतश्च रूक्षाङ्गो दोषयुक्तश्च सूतकः। दशाष्टसंस्कृतैः सिद्धो देहं लोहं करोति सः।।
अथान्यकूपजः सोऽपि चञ्चलः श्वेतवर्णवान्। पारदो विविधैर्योगैः सर्वरोगहरः स हि।।
मयूरचन्द्रिकाच्छायः स रसो मिश्रको मतः। सोप्याष्टा दश संस्कारयुक्तश्चातीव सिद्धिदः।। (R.R.S.1/68-74)

S.No.	Types	Colour	Impurities	Uses
1	Rasa	Rakta	Free from impurities	Rasayana
2	Rasendra	Peeta	Free from impurities	Rasayana
3	Suta	Ishat Peeta	With impurities	Deharogahara
4	Parada	Shweta	With impurities	Sarvarogahara
5	Mishraka	Mayura Chandrika varna	With impurities	Sarvasiddhidayaka

Depending on the Colour

S.No.	Types	Color	Varna	Karma
1	Brahmana	White	Shweta	Shwetakarma purpose
2	Kshatriya	Red	Rakta	Therapeutics
3	Vaishya	Yellow	Peeta	Peetakarma (alchemy or to prepare gold)
4	Shudra	Black	Krishna	Used in Maintaining health

Grahya-Agrahya of Parada

शुद्धः सूतो यतस्त्वन्तः सुनीलो बहिरुज्ज्वलः। सूर्यप्रभश्चाविशुद्धो धूम्रो वा परिपाण्डुरः।। (R.T.5/5)

Characteristics of Genuine Parada are:

1. Antah sunilah- Bluish tinge inside.
2. Bahirujjwala- shining externally.
3. Madhyahna surya pratima prakasha- shines as bright as mid day sun.

Characteristics of Impure Parada are:

1. Dhumra- smoky appearance.
2. Paripandura- pale colour.
3. Chitra- with various shades and radiance.

Shuddha Parada from inside seems blue tinged, but from outside it is lustrous and shines like a mid day sun, which resembles with the properties of mercury explained in modern chemistry texts. Mercury is a silver white liquid metal, with a slight bluish tinge. In thin films, it transmits violet light. (Dictionary of Applied chemistry vol IV page No 270).

Parada Dosha

According to different rasa classics, doshas of Parada are mainly of 3 types:

1. Naisargika doshas (Natural impurities).
2. Yougika doshas (Physical impurities).
3. Oupadika doshas (Chemical impurities in the form of coating).

1. Naisargika Doshas

Mercury, which is occurring in native and compound form generally possess some impurities due to its natural tendency of amalgamation. As these impurities occur due to its nature, these doshas are known as "Naisargika doshas".

विषं वह्निर्मलश्चेति दोषा नैसर्गिकास्त्रयः। रसे मरणसन्तापमूर्च्छानां हेतवःक्रमात्।। (R.R.S.11/21)

Naisargika Dosha and its Effect on Sharira

S.No.	Naisargika Dosha	Dosha Prabhava
1	Visha	Mrityu
2	Agni	Santapa
3	Mala	Moorcha

2. Yougika Doshas

The impurities mixed by the traders for the commercial gain by increasing the weight of Parada by adding some cheaper metals like Naga, Vanga are called "Yougika doshas".

यौगिकौ नागवङ्गौ द्वौ तौ जाड्याध्मानकुष्ठदौ। (R.R.S.11/18)

Yougika Dosha and its effect on sharira

S.No.	Yougika Dosha	Dosha Prabhava
1	Naga	Jadya, Adhmana, Kushta
2	Vanga	Jadya, Adhmana, Kushta

3. Oupadika Doshas

These are the Chemical impurities in the form of coating which are formed by its exposure to different atmospheric conditions for long period. They are also called as kanchuka doshas and each one has a different yoni (sources).

औषधिकाः पुनश्चान्ये कीर्तिताः सप्त कञ्चुकाः। भूमिजा गिरिजा वार्जा द्वे च द्वे नागवङ्गजे। (R.R.S.11/19)

Oupadhika (Sapta kanchuka) Dosha and its effect

S.No.	Oupadhika Dosha	Dosha Prabhava
1	Bhumija	Kushta

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2	Girija	Jadya
3	Varija	Vata Sanghata
4	Two Naga Doshaja	Vividha Dosha Vikara
5	Two vanga Doshaja	Vividha Dosha Vikara

Kanchuka Doshas

Literally Kanchuka means thin layer. Kanchuka doshas are the impurities of Mercury which are seen as a thin layer covering it. This is due to tarnishing of mercury. There is some difference of opinion amongst ancient scholars regarding their name and source but all of them considered it to be seven in number.

पर्पटी पाटिनी भेदी द्रावी मलकरी तथा। अन्धकारी तथा ध्वाङ्क्षी विज्ञेया: सप्त कञ्चुका:।।
भूमिजा: कुर्वते कुष्ठं गिरिजा जाड्यमेव च। वारिजा वातसंघातं दोषाढ्यं नागवङ्गयो:।। (R.R.S.11/25-26)

Kanchuka Doshas and their effects

S.No.	Kanchuka Dosha	Yoni	Dosha Prabhava
1.	Parpati	Mrunmaya (Prithvi)	Kushta,
2.	Patini	Pashanaja (Girija)	Jadhya, Admana
3.	Bhedi	Jalaja (Varija)	Vali, Palita, Khalitya, Vaksangatha, Mala Bhedana.
4.	Dravi	Nagaja (Shyama)	Mahakusta, Sweta Kusta, Udara, Kamala, Pandu, Prameha.
5.	Malakari	Nagaja (Kapalika)	Dadru, Gaja Karna, Doshavardhaka.
6.	Dhwankshi	Vangaja (Kapali)	Swara Parushyakara.
7.	Andhakari	Vangaja (Kalika)	Marmacheda, Vastishoola, Andhatva.

According to some Rasa classics like Rasa tarangini, Ayurveda prakasha, there are asta mahadoshas in Parada. They are as follows:

नागवङ्गौ वह्निमलौ चापल्यं गरलं गिरि:। असह्याग्निश्च विज्ञेया दोषा नैसर्गिका रसे।। (R.T. 5/7)
नागो वङ्गो मलो वह्निश्चापल्यं च विषं गिरि:। असह्याग्निर्महादोषा निसर्गात् पारदे स्थिता:।। (A.P. ¼)

1.	Naga
2.	Vanga
3.	Vahni
4.	Mala

5.	Chapalya
6.	Garala/ Visha
7.	Giri
8.	Asahyaagni

Parada Shodhana

There are two types of Shodhana-

1. Samanya Shodhana,
2. Vishesha Shodhana.

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Pre-Preparation Process

सुदिने शुभनक्षत्रे स्वेष्टदेवञ्च शङ्करम्। भैरवञ्चापि सम्पूज्य रसकर्म समाचरेत्।। (R.T.5/19)

Rasakarma should be started on shubha dina and shubha nakshatra. After worshipping Lord Shankara and Bhairava and ishta devatas, the procedures are to be carried out. The studies have shown that those particular days, time and worshiping will impart concentration and dedication, hence the expected efficacy in medicine can be achieved.

Quantity of Parada for Shodhana

द्वे सहस्रे पलानां तु सहस्रं शतमेव वा। अष्टाविंशत्पलान्येव दश पञ्चैकमेव वा।।
पलार्द्धेनैव कर्तव्यः संस्कारः सूतकस्य च। सुदिने शुभनक्षत्रे रसशोधनमाचरेत्। (R.R.S.11/24-23)

The quantity of Parada to be taken for Parada samskara should be 2000 Pala (96000 gms), 1000 pala (48000 gms), 100 pala (4800 gms), 28 pala (1344 gms), 10 pala (480 gms) and minimum of 5 pala (240 gms). Parada samskara should not be carried out with less than ½ pala (24 gms) of Parada.

Samanya Shodhana

Method I

रसेश्वरं समसुधारजसा मर्दयेत् त्र्यहम्। ततो द्विगुणवस्त्रान्तर्गालितं खल्वके न्यसेत्।।
रसोनं निस्तुषं तुल्यं तदर्धं लवणं हरेत्। तत्कल्के मर्दयेत्सूतं यावदायाति कृष्णताम्।।
कृष्णं कल्कं परित्यज्य तथा प्रक्षाल्य युक्तितः। एवमेकेन वारेण रसेन्द्रः शुद्धिमाप्नुयात्।। (R.T.5/27-29)

Parada & Sudha raja (Lime powder) should be taken in equal quantity and mardana is done for 3 days.

Then the Parada is filtered through two folded cloth.

Later equal quantity of nistusha lashuna and half quantity of Saindhava lavana is added to the filtered Parada and subjected for mardana until it becomes black coloured kalka.

Finally prakshalana is done to separate Kalka and shuddha Parada is dried and stored.

Method II

कुमारिकाचित्रकरक्तसर्षपैः कृतैः कषायैर्बृहतीविमिश्रितैः
फलत्रिकेणापि विमर्दितो रसो दिनत्रयं सप्तमलैर्विमुच्यते।। (R.T.5/30)

The mixture of Gritha kumari swarasa, Chitraka kwatha, Raktasarshapa kwatha, Brihati Kwatha, Triphala kwatha is taken and parada is triturated with this mixture for 3 days.

Then the Parada is washed with kanji, dried and stored in suitable container.

The shuddha Parada thus obtained will be devoid of sapta malas.

Method III

नागवल्लीदलरसैस्तथा चार्द्रकजै रसैः। क्षारत्रययुतैश्चापि रसराजं विमर्दयेत्।।
ततस्तेभ्यः पृथक् कृत्वा सप्तदोषविवर्जितम्। मुक्ताफलसमाकारं रसराजं प्रयोजयेत्।। (R.T.5/34-35)

Parada is triturated with Nagavalli swarasa, Ardraka swarasa and ksharadravya for 3 days.

Then Parada is washed with water and dried.

This parada will be devoid of Sapta dosha and shines like mukta.

Method IV

एकेन लशुनेनापि शुद्धो भवति पारदः। पिष्टो लवणसंयुक्तो सप्ताहं तप्तखल्लके।। (A.P.1/165)

Parada is triturated with Lashuna & Saindava lavana in Tapta Khalvayantra for 30 days.

Next day, the mixture is washed with water and Parada is collected and stored.

Samanya Shodhana of Parada according to different authors

S.No.	Shodhana dravyas	Method	Reference
1	Sudharaja, Lashuna, Saindava Lavana	Mardana done for 3 days, Vastragalana Mardana till kalka becomes black colour	R.T.5/27-29
2	Kumari Swarasa, Chitraka kwatha, Raktasarshapa kwatha, Brihati Kwatha, Triphala Kwatha.	Mardana for 3 days Prakshalana with kanji.	R.T.5/30
3	Nagavalli Swarasa, Ardraka swarasa, Ksharatraya	Mardana for 3 days, Prakshalana. with Amla Dravya.	R.T.5/34-35
4	Lashuna, Saindhava Lavana	Mardana for 30 days in Tapta Khalva, Prakshalana	A.P.1/165

Probable Physico-chemical changes during above Processing

The heat produced due to continuous friction of mortar and pestle along with uniform rising temperature would seize the impurities. Obtained mercury was bright and shiny white in colour as it has undergone purification procedures. The impurities might have got dissolved or absorbed in the lime stone powder, garlic paste and salt, with the trituration, making it more brighter in colour. Researches have proved the effect of garlic in heavy metal poisoning by in vitro studies. Also garlic contains sulphur which acts as a chelator for mercury poisoning hence the use of garlic in the process of purification of mercury helps to remove the toxic effect of the heavy metal

mercury. Ajoene present in the garlic is the most active compound responsible for multiple bonding with mercury. Hence media, the paste of Garlic becomes blackish in color due to newly formed HgS compound.

Vishesha Shodhana of Parada

Specific process of shodhana done is to remove specific doshas separately is Vishesha Shodhana. This is done for Rasayana purpose.

धूमेष्टिकाहट्टविलासिनीनां सोर्णैस्तु चूर्णैः परिमर्द्य सूतम्। प्रक्षालयेदम्लजलेन सम्यक् ततो रसो मुञ्चति नागदोषम्।। मृगेक्षणाङ्कोलनिशोत्थचूर्णैः सूतो जहातीह तु वङ्गदोषम्। चित्रोऽग्निदोषं विनिहन्ति शीघ्रं दोषं मलोत्थं खलु राजवृक्षः। चापल्यहारी खलु कृष्णधूर्तो विषापहर्त्री त्रिफला प्रशस्ता। दोषं गिरेस्त्रयूषणमाशु हन्यात् त्रिकण्टको वह्न्यसहत्वदोषम्। चूर्णे कलांशप्रमितं तु सूतात् सकन्यकं मापितभेषजानाम्। विमर्दयेत्खल्वगतं दिनैकं प्रक्षालयेच्चापि ततोऽम्लतोयैः।।

(R.T.5/22-25)

Vishesha Shodhana of Parada

S.No.	Dosha	Shodhana dravyas	Method
1	Naga Dosha	Gruhadhuma, Ishtika Choorna, Haridra Choorna, Urna bhasma	Mardana for 1 day, Prakshalana with Kanji
2	Vanga Dosha	Indrayava Ankola Churna, Haridra Churna	Mardana, Prakshalana with Kanji.
3	Agni Dosha	Chitrakamula Churna or Triphala Churna	Mardana
4	Mala Dosha	Aragwada Churna or Kumari Swarasa,	Mardana, Prakshalana
5	Chapala Dosha	Krishna dattura Panchanga	Mardana, Prakshalana
6	Visha Dosha	Triphala Churna or Chitrakamula Churna	Mardana, Prakshalana
7	Giri Dosha	Trikatu Churna	Mardana, Vastra Ghalana
8	Asahyaagni Dosha	Gokshura Churna	Mardana

Parada Samskara

The process of subjecting a substance to add specific qualities is called Samskara.

Almost all RasAcharyas opines that, bala, teja, qualities of Parada can be enhanced. According to various authors, Ashtadasha samskara i.e. 18 Samskaras of Parada have been explained. Among them, first eight are for the purpose of roga-nivarana, rasayana and last ten are for deha vadha and dhatu vedha purpose.

Eighteen samskaras of parada are–

1.	Swedana
2.	Mardana
3.	Moorchana
4.	Utthapana
5.	Patana
6.	Bodhana
7.	Niyamana
8.	Deepana
9.	Gagana Bhakshana

10.	Charana
11.	Garbha dhruti
12.	Bahya dhruti
13.	Jaarana
14.	Ranjana
15.	Sarana
16.	Sankramana
17.	Vedha
18.	Bhakshana

Ashta Samskara

स्यात्स्वेदनं तदनु मर्दनमूर्छनं च उत्थापनं पातनरोधनियामनानि।
सन्दीपनं..... (R.R.S.11/12)

Eight Samskaras of Parada are-

1. Swedana
2. Mardana
3. Moorchana

4. Utthapana
5. Patana
6. Bodhana

7. Niyamana
8. Deepana

1. Swedana

Definition:

क्षाराम्लैरौषधैर्वाऽपि दोलायन्त्रे स्थितस्य हि। पचनं स्वेदनाख्यं स्यान्मलशैथिल्यकारकम्।। (R.R.S.8/61)

Swedana samskara is the pharmaceutical process where parada is subjected to swedana by placing it in dolayantra containing the liquid media of kshara or amla jala and other oushadha dravyas. This samskara will loosens the doshas in Parada.

Drugs Required

त्र्यूषणं लवणासूर्यौ चित्रकार्द्रकमूलकम्। क्षिप्त्वा सूतो मुहुः स्वेद्यः कञ्जिकेन दिनत्रयम् ।। (R.R.S.11/26)

1.	Parada- 1 part
2.	Shunti- $\frac{1}{16}^{th}$ part
3.	Pippali- $\frac{1}{16}^{th}$ part
4.	Maricha- $\frac{1}{16}^{th}$ part
5.	Saindava lavana- $\frac{1}{16}^{th}$ part

6.	Rajika- $\frac{1}{16}^{th}$ part
7.	Chitraka- $\frac{1}{16}^{th}$ part
8.	Ardraka- $\frac{1}{16}^{th}$ part
9.	Moolaka - $\frac{1}{16}^{th}$ part

Method

1. Fine powder of the above drugs are taken, mixed and triturated with kanji to make it into kalka form.

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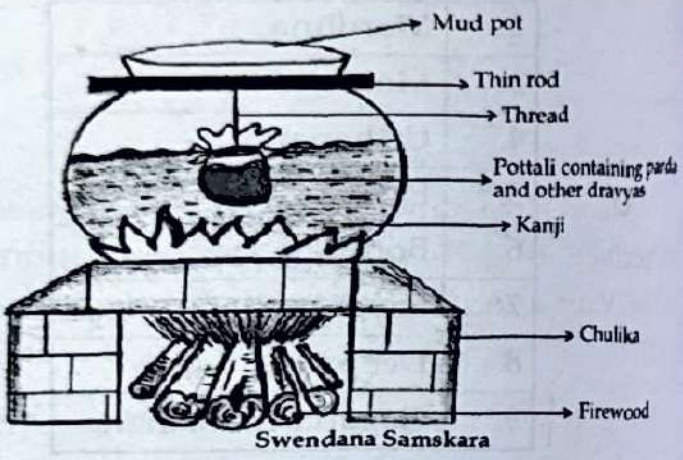
2. This kalka is made into a cup like form and parada is placed in it, later the opening is covered with kalka, wraped the kalka with the leaf of palasha or bhurja patra and tied with a thread. This is prepared into pottali using cloth.
3. This pottali is made to hang inside the dolayantra containing kanji as the liquid medium.
4. Then dolayantra is subjected to heat in the moderate fire for 3 days, by adding the Kanji when its level reduces.
5. Next day, pottali is removed, parada is collected, washed with kanji and stored.



Swendana Samskara

Benefits

Mala shithilikarana (loosening of the blemishes in the Parada)

2. Mardana

Definition

उदितैरौषधैः सार्धं सर्वाम्लैः काञ्जिकैरपि। पेषणं मर्दनाख्यं स्याद्बहिर्मलविनाशनम्।। (R.R.S.8/63)

Mardana samskara is the pharmaceutical process where parada along with the prescribed drugs is subjected to trituration using Kanji or any amla dravyas. This samskaras will destroys the bahya mala of the Parada.

Drugs Required

गृहधूमेष्टिकाचूर्णं तथा दधि गुडान्वितम्। लवणासुरिसंयुक्तं क्षिप्त्वा सूतं विमर्दयेत्।। (R.R.S.11/31)

1. Swedana samskarita Parada- 1 part
2. Gruhadhooma- $\frac{1}{16}^{th}$ part
3. Ishtika churna- $\frac{1}{16}^{th}$ part
4. Dadhi- $\frac{1}{16}^{th}$ part
5. Guda- $\frac{1}{16}^{th}$ part
6. Saindava lavana- $\frac{1}{16}^{th}$ part
7. Rajika- $\frac{1}{16}^{th}$ part

Method

1. Swedana samskarita Parada is taken in the Tapta khalwa yanta along with the other drugs mentioned for mardana samskara.
2. Sufficient amount of Kanji is added and trituration is done for 3 days.
3. Then Parada is washed with water and stored.

Benefits

Removes the bahirmala of Parada

3. Moorchana

Definition

मर्दनाऽऽदिष्टभैषज्यैर्नष्टपिष्टत्वकारकम्। तन्मूर्छनं हि वङ्गाहिभूजकञ्चुकनाशनम्।। (R.R.S.8/61)

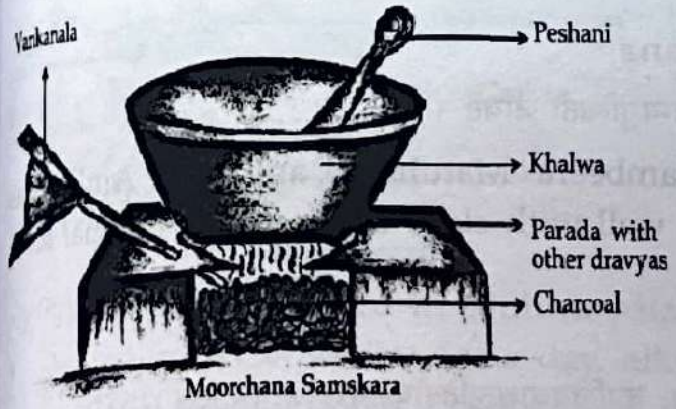
Moorchana samskara is the pharmaceutical process where Parada along with the prescribed drugs is subjected to trituration till it looses its pishtatva. By this, it will get rid of Vanga and other kanchuka doshas.

Drugs Required

गृहकन्या मलं हन्यात् त्रिफला वह्निनाशिनी। चित्रमूलं विषं हन्ति तस्मादेभिः प्रयत्नतः।। (R.R.S.11/35)

1. Mardana samskarita Parada - 1 part
2. Kumari swarasa - $\frac{1}{16}^{th}$ part
3. Triphala kwatha - $\frac{1}{16}^{th}$ part
4. Chitrakamoola kwatha - $\frac{1}{16}^{th}$ part

Method



Moorchana Samskara

1. Mardana samskarita Parada is taken in the khalwa yantra along with the other drugs mentioned for moorchana samskara.
2. Trituration is done till Parada loose its chapalatva and liquidity and attain nashtapishtatva (Nashtapishtatva is a state of Parada where it looses its original state (like chanchalatwa) and attains the powder form).

Benefits

- Removes the Vanga and other Kanchuka doshas.
- Note: Most of the texts not specified the type of Khalwa yantra to be used for Mardana and Moorchana samskara. But in Rasasara, the author had stressed to use the Tapta khalwa yantra for the purpose of doing Mardana of Parada 'प्रमर्दयेत् तप्तखल्वे रक्षितव्यं प्रयत्नतः' (Rasasara)

4. Utthapana

Definition

स्वेदातपादियोगेन स्वरूपापादनं हि यत्। तदुत्थापनमित्युक्तं मूर्च्छाव्यापत्तिनाशनम्।। (R.R.S.8/65)

Uttapana samskara is the pharmaceutical process where parada will get back its swaroopa (state), after subjecting it to different procedures like swedana, atapa sevana etc. This samskara will destroy the moorcha vyapath of the Parada.

Method

Different methods has to be adopted to regain the original state of Parada which had lost during moorchana samskara.

i. Swedana and Prakshalana

अथवा काञ्जिकेनैव रसेन्द्र स्वेदयेद् बुधः। अम्लैः प्रक्षालयेत्सम्यगुत्थितो रसराड् भवेत्।। (R.T. 5/66)

Moorchita Parada is tied in the pottali and subjected to swedana in dolayantra using the kanji. Later it is washed with any amla dravyas or kanji to remove the drugs mixed with Parada during moorchana samskara and aids the Parada to regain its original state.

ii. Mardana and Prakshalana

रसेन्द्र काञ्जिकेनेह याममात्रं विमर्दयेत्। सलिलैः क्षालयेत्सम्यगुत्थितो जायते रसः।। (R.T. 5/67)

Moorchita Parada is subjected to mardana with kanji in tapta khalwa yantra for 3 hours and then washed with water to do the utthapana (regain the original form) of Parada.

iii. Atapa Sevana and Vastra Nishpeedana

जम्बीरमातुलुङ्गाद्यैः पेषयेदातपे रसम्। वसनात्सारयेत्सम्यगुत्थितो जायते रसः।। (R.T. 5/68)

Moorchita Parada is triturated with Jambeera. Matulunga and other Amla rasas in bright sun light and later it is squeezed well with cloth to regain the original form of parada.

iv. Patana

अस्माद् द्विरेकात्संशुद्धो रसः पात्यस्ततः परम् । उद्धृतः काञ्जिक्वाथत्पूतिदोषनिवृत्तये।। (R.R.S.11/33)

Moorchita Parada is enclosed in any patana yantra or damaru yantra and heated on moderate fire to do the Patana of Parada. Later it is washed with Kanji by which Parada will regain its original form and get rid of Poothi doshas i.e., Naga & Vanga dosha.

Depending upon the feasibility and the quantity of Parada regained back, any of the above methods or in combination or all the methods can be adopted.

Benefits

- Removes the moorcha vyapath of Parada.
- Eradication of Poothi doshas like Naga, Vanga.

5. Patana

Definition

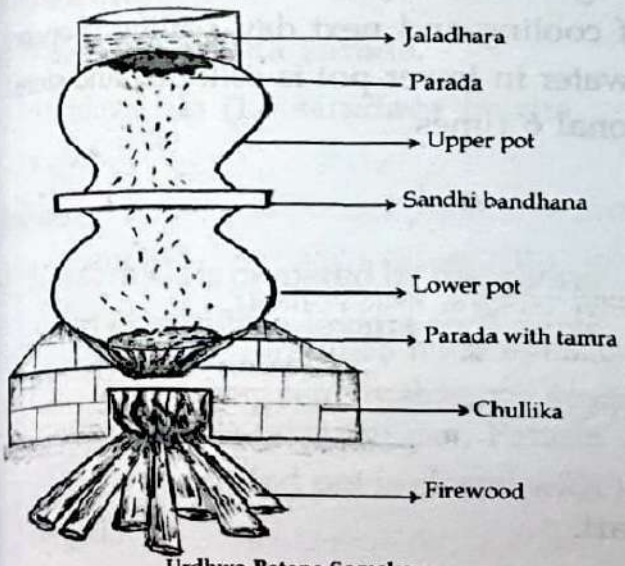
ऊर्ध्वाधोर्दितपारदस्य यन्त्रस्थितस्योर्ध्वमधश्च तिर्यक्। निर्यातनं पातसंज्ञमुक्तं वङ्गाहिसम्पर्कजकञ्चुकघ्नम्।। (R.R.S.8/67)

Patana samskara is the pharmaceutical process where parada is subjected to trituration with the specified drugs and it is recovered by heating it in urdhwa or adhah or tiryak patana yantra. This samskara will remove the kanchuka doshas caused by the contact of Vanga and others.

Patana of Parada is done by three methods-

I. Urdhwa Patana II. Adhah Patana III. Tiryak Patana

I. Urdhwa Patana



Urdhwa-Patana Samskara

Drugs Required

ताम्रेण पिष्टिकां कृत्वा पातयेदूर्ध्वभाजने।
वङ्गनागौ परित्यज्य शुद्धो भवति सूतकः।।
(R.R.S.11/34)

1. Utthapana samskarita Parada- 3 parts.
2. Tamra- 1 Part.
3. Nimbu rasa- Quantity required.

Method

1. Utthapita Parada is mixed with shuddha Tamra and triturated by mixing Nimbu rasa till it attains pishti form.
2. This pishti is enclosed in urdhwa patana yantra (by placing it in lower pot) and heated in moderate fire for a day, allowed for self cooling and same procedure repeated for additional 2 times
3. Later, the urdhwa patita Parada is collected (from the inner surface of the upper pot), filtered and stored.

II. Adhah Patana

Drugs Required

त्रिफला शिग्रुशिखिभिर्लवणसुरिसंयुतैः।। नष्टपिष्टंरसं कृत्वा लेपयेच्चोर्ध्वभाजने।
ततो दीप्तैरधःपातमुत्पलैस्तत्र कारयेत्।। (R.R.S.11¼0)

1.	Urdhwa patita Parada- 1 Part
2.	Haritaki - 1/16th Part
3.	Vibhitaki - 1/16th Part
4.	Amalaki - 1/16th Part
5.	Shigru - 1/16th Part
6.	Shikhi (Chitraka moola) - 1/16th Part
7.	Saindava lavana - 1/16th Part
8.	Asuri (Rajika) - 1/16th Part

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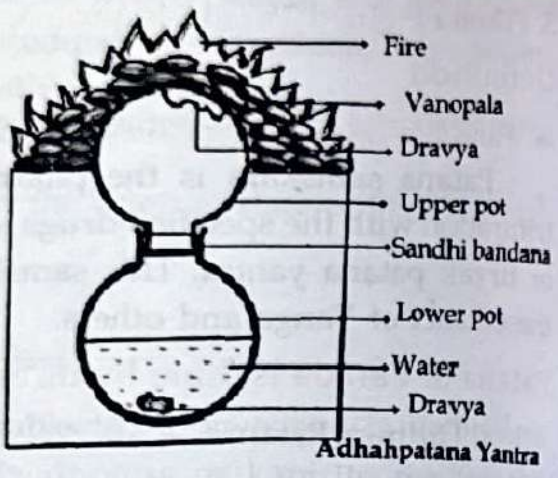
Method



Adhahpatana Yantra

1. Parada obtained after urdhwa patana samskara is mixed with the other drugs and grinded till it attains the stage of nashtapishtatwa.
2. This mixture is pasted inside the upper pot of adhapatana yantra and that of lower pot is filled with water and sealed the mouth of the vessels.
3. Then the yantra is placed inside the ground and provided with heat from the cowdung cakes heaped over the upper pot.
4. After complete burning, allowed for self cooling and next day, sealing is opened and Parada settled at the bottom of the water in lower pot is collected and stored. The same procedure repeated for additional 6 times

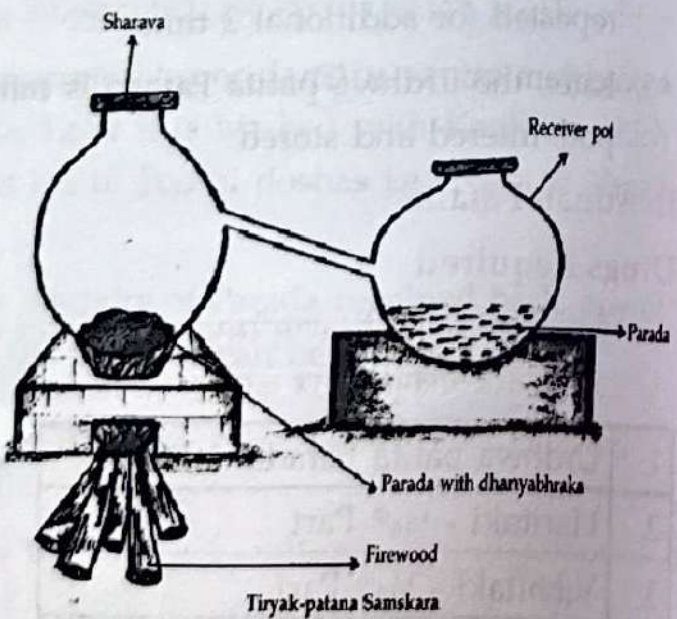
III. Tiryak Patana

Drugs Required

तिर्यक्पातनविधिना निपातितः सूतराजश्च। श्लक्ष्णीकृतमभ्रदलं रसेन्द्रयुक्तं तथाऽऽरनालेन।
खल्वे दत्त्वा मृदितं यावत्तन्नष्टपिष्टतामेति। कुर्यात्तिर्यक्पातनपातितसूतं क्रमेण दृढवह्निम्।
संस्वेद्यः यात्योऽसौ न पतति यावद्दृढश्चाग्नौ।। तदाऽसौ शुद्ध्यते सूतः कर्मकारी भवेद्ध्रुवम्।। (R.R.S.1¼5-47)

1. Adah patita Parada- 1 part.
2. Abhraka powder (Dhanyabhraka)- ¼th part.
3. Aranala-Quantity required.

Method



Tiryak-patana Samskara

1. Adah patita Parada is mixed with the dhanyabhraka and triturated by adding Aranala till it becomes nashtapishta.
2. This mixture is enclosed in Tiryak patana yantra and heated in kramagni (mild, moderate and intense).
3. Parada obtained from this yantra is subjected to swedana in dolayantra and Parada obtained is ground with Abhraka and subjected again to patana process.
4. These process are continued alternatively till Parada becomes thermostable.

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5. Thus obtained Parada is pure and highly effective.

Benefits of Patana Samskara

- Parada will get rid of Naga, Vanga and other kanchuka doshas.
- Parada becomes pure and highly effective therapeutically.

6. Bodhana

Definition

जलसैन्धवयक्तुस्य रसस्य दिवसत्रयम्। स्थितिरास्थापनी कुम्भे याऽसौ रोधनमुच्यते।। (R.R.S.8/68)

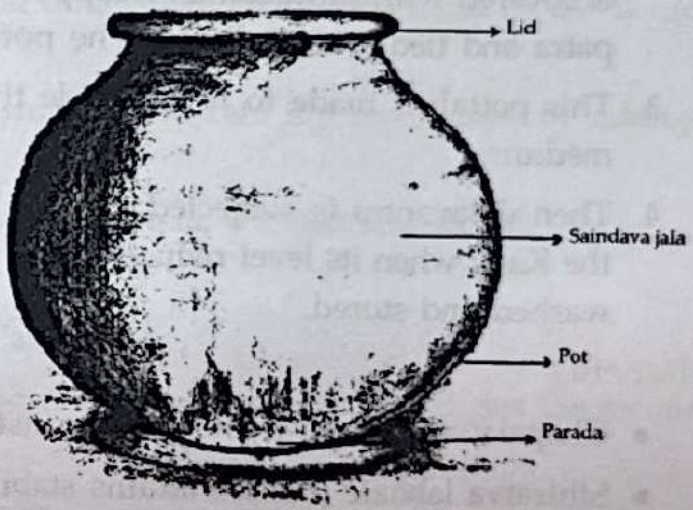
Bodhana samskara is the pharmaceutical process where parada is kept undisturbed in the pot containing the saline water for 3 days.

Drugs Required

1. Patana samskarita Parada.
2. Saindava jala (1:3 saindava lavana : water).

Method

1. Saindava jala is prepared by dissolving 1 part of saindava lavana in 3 parts of water.
2. This solution is taken in pot, Parada is placed inside and pot is closed with the lid.



Bodhana Samskara

3. This pot containing Parada is kept undisturbed for 3 days and collected later.

Benefits

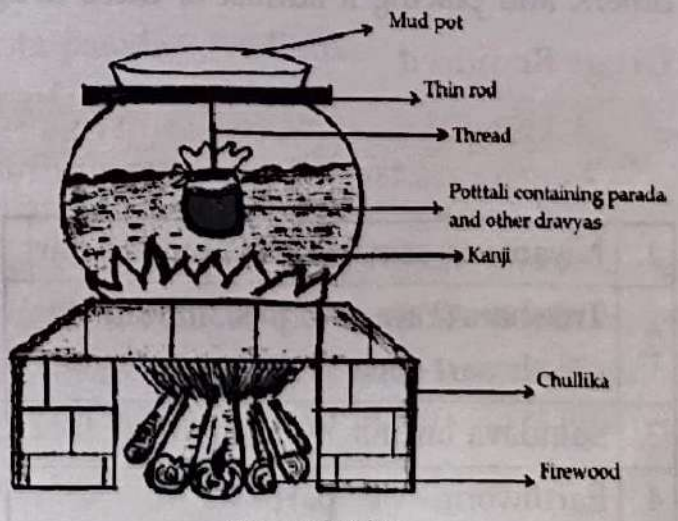
- Shandatva nivarate (removes the inefficiency quality of Parada).
- Veeryam prapnoti (Parada gains the potency).

7. Niyamana

Definition

रोधनाल्लब्धवीर्यस्य चपलत्वनितृत्तये।
क्रियते पारदे स्वेदः प्रोक्तं नियमनं हि तत्।।
(R.R.S.8/69)

Niyamana samskara is the pharmaceutical process where parada is subjected to swedana to remove the chapalatwa gained by the Rodana samskara along with the veerya.



Niyamana Samskara

Drugs Required

नियम्योऽसौ ततः सम्यक्चपलत्वनिवृत्तये। कर्कोटीफणिनेत्राभ्यां वृश्चिकाम्बुजमार्कवैः।। (R.R.S.11/50)

1.	Bhodhana samskarita parada- 1 Part
2.	Vandhyakarkoti- 1/16th part
3.	Sarpakshi- 1/16th part
4.	Vrischikali- 1/16th part
5.	Saindava lavana- 1/16th part
6.	Bhringaraja- 1/16th part

Method

1. Fine powder of the above drugs are taken, mixed and triturated with kanji to make it into kalka form.
2. This kalka is made into a cup like form and parada is placed in it, later the opening is covered with same kalka, wrapped the kalka with the leaf of Palasha or Bhurja patra and tied with a thread. The pottali of this is made using cloth.
3. This pottali is made to hang inside the dolayantra containing kanji as the liquid medium.
4. Then dolayantra is subjected to heat in the moderate fire for 3 days, by adding the Kanji when its level reduces. Next day, pottali is removed, parada is collected, washed and stored.

Benefits

- Chapalatva nivrutti (removes the unsteadiness of Parada).
- Sthiratva labhate (Parada attains stability).

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8. Deepana

Definition

धातुपाषाणमूलाद्यैः संयुक्तो घटमध्यगः। ग्रासार्धं त्रिदिनं स्वेदो दीपनं तन्मतं बुधैः।। (R.R.S.8/70)

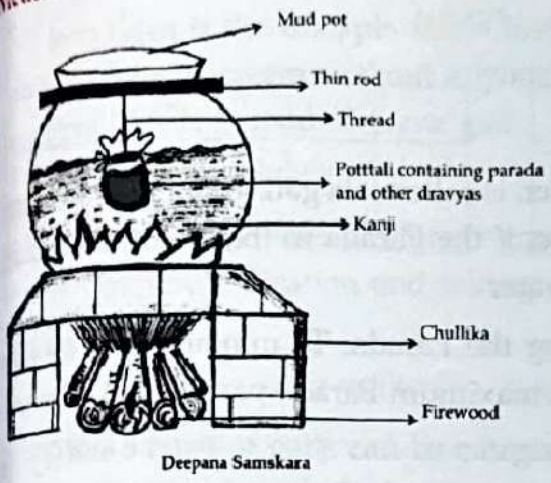
Deepana samskara is the pharmaceutical process where parada is subjected to swedana after mixing it with dhatus (metals), pashanas (minerals), moolas (herbs) and others, and placing it admist of these drugs to increase its capacity of digestion.

Drugs Required

त्रिक्षारसिन्धुखगभूशिखिशिग्रुराजीतीक्ष्णाम्लवेतसमुखैर्लवणोषणाम्लैः।
नेपालताम्रदलशोषितमारनाले साम्लासवाम्लपुटितं रसदीपनं तत् ।। (R.R.S.11/52-53)

1.	Niyamana samskarita Parada- 1 Part
2.	Trikshara (Yava, swarjikshara, tankana) - 1/16th part each
3.	Saindava lavana- 1/16th part
4.	Earthworm- 1/16th part
5.	Chitraka- 1/16th part
6.	Shigru twak- 1/16th part
7.	Rajika- 1/16th part
8.	Pippali- 1/16th part
9.	Amlavetasa- 1/16th part

Method



Deepana Samskara

1. Fine powder of the above drugs are taken, mixed and triturated with kanji to make it into kalka form.
2. This kalka is made into a cup like form and parada is placed in it later the opening is covered with same kalka, wrapped the kalka with the leaf of palasha or bhurja patra and tied with a thread. This is prepared into pottali using cloth.
3. This pottali is made to hang inside the dolayantra containing kanji as the liquid medium.
4. Then dolayantra is subjected to heat in the moderate fire for 3 days, by adding the Kanji when its level reduces.
5. Next day, pottali is removed, collected the parada, washed and stored.

Benefits

Enhances the Grasartha property of Parada,

Does Parada Deepana (increases the digestive power of parada to digest the metals and minerals added to it).

Increases the veerya and tejas of Parada.

Matra

According to Rasendra Purana, Mrutaparada - 2 Ratti (250 mg)

Abraka satvajarita parada - 1 Ratti (125 mg) According to R.T.,

Swarnajarita parada - ½ Ratti

Vaikrantajarita Parada - ½ Ratti.

Vajrajarita parada - ¼th Ratti.

Parada Gati

The word 'Gati' refers to gamana or chalana which means 'moving away'. So Parada gati refers to the movement of some portions of Parada during different procedures resulting in its loss. Parada will get wasted while it is subjected for different processing due to its gunas like dravatva, chanchalatva. It evaporates even at room temperature and process accelerates if temperature increases. Our Acharyas have mentioned 5 different ways of loss of Parada which are mentioned as Parada gatis.

जलगो जलरूपेण त्वरितो हंसगो भवेत्।। मलगो मलरूपेण सधूमो धूमगो भवेत्।
अन्या जीवगतिर्देवी जीवोऽण्डादिव निष्क्रमेत्। (R.R.S. 1/83-84)

The 5 types of Parada gati are-

1. Jala Gati

Loss of Parada while washing with water, is called Jala gati. Washing is the common procedure done in all ashta samskara. Some of the Parada in the form of fine particles floats and get washed off along with the water.

One should be cautious while washing the Parada. To minimize loss, the water should be kept steady for sometime so that maximum Parada particles get sedimented at the bottom.

2. Hamsa Gati

Hamsa gati is the loss of Parada during trituration or transferring parada from one vessel to another due to swiftness. If the procedure is carried out in a hurry, due to chanchala guna of Parada, some particles of mercury may jump or fly off just like a swan. Hence it is named as Hamsa gati.

To minimize this loss, more care should be taken while handling the parada and procedures should be carried out with patience and more involvement. Vessel containing Parada should be kept closed as it gets evaporated in small quantities even at room temperature.

3. Mala Gati

Mala gati is the loss of Parada along with its mala (impurities) during the process of malanirharana by shodhana or samskara. During the process of removal of impurities by various procedures, some amount of Parada will be lost due to its adherence to impurities.

To minimize this loss, suitable procedure should be adopted and each and every step told should be followed accordingly and care should be taken while washing and drying.

4. Dhuma Gati

Dhuma gati is the loss of Parada in the form of dhuma (fumes) during the process which involves heating. During the processing of Parada, if the sandhibandana is not properly done or proper cooling environment is not provided for condensation of Parada in the procedures like Patana samskara and others, Parada will escape along with the dhuma.

To minimize this loss, good pot without any cracks or holes should be selected and proper sealing should be done. Proper heating pattern should be followed and suitable condensation process should be adopted.

5. Jeeva Gati

Jeeva Ggati is the unexplainable loss of Parada during its processing. Just as the jeeva gets out of shareera without anyone's notice, some portion of Parada gets wasted unnoticed. This is termed as jeeva gati.

मन्त्रध्यानादिना तस्य रूध्यते। (R.R.S. 1/85)

It cannot be controlled. Performing pooja, dhyana and chanting mantra may reduce its loss. Complete dedication and taking utmost care in Parada processing will reduce the Parada gati

चतुरस्रो गतयो दृश्या अदृश्या पञ्चमि गतिः। (R.R.S. 1/85)

These 5 types of gatis can be categorised under 2 types– Drushya and Adrushya. Jeeva gati is Adrushya and other 4 gatis are Drushya.

Parada Bandha

येन येन हि चाञ्चल्यं दुर्ग्रहत्वं च नश्यति।। रसराजस्य संप्रोक्तो बन्धनार्थो हि वार्तिकः।। (R.R.S. 11/60)

Parada bandha is the pharmaceutical process by which the chanchalya and durgrahatva property of Parada is lost. All such procedures are called as Parada bandha by RasAcharyas.

By bandhas, Parada will get rid of its liquidity and become solid. By this, it will become stable, so that it can be handled easily and administered to the patient.

हठारोटौ तथाभासः क्रियाहीनश्च पिष्टिका। क्षारः खोटश्च पोटश्च कल्कबन्धश्च कज्जलिः।।
सजीवश्चैव निर्जीवो निर्बीजश्च सबीजकः। शृङ्खला द्रुतिबन्धौ च बालकश्च कुमारकः।।
तरुणश्च तथा वृद्धो मूर्तिबद्धस्तथाऽपरः। जलबन्धोऽग्निबन्धश्च सुसस्कृतकृतभिधः।।
महाबन्धाभिधश्चेति पञ्चविंशतिरीरिताः। केचिद्वदन्ति षड्विंशो जलूकाबन्धसंज्ञकः।। (R.R.S. 11/61-63)

There are 25 types of Parada Bandha -

1.	Hata Bandha	10.	Kajjali Bandha	18.	Kumara Bandha
2.	Arota Bandha	11.	Sajeeva Bandha	19.	Taruna Bandha
3.	Abhasa Bandha	12.	Nirjeeva Bandha	20.	Vruddha Bandha
4.	Kriyaheena Bandha	13.	Nirbeeja Bandha	21.	Moorti Bandha
5.	Pishtika Bandha	14.	Sabeeja Bandha	22.	Jala Bandha
6.	Kshara Bandha	15.	Shrunkala Bandha	23.	Agni Bandha
7.	Khota Bandha	16.	Dhruti Bandha	24.	Susanskrutha Bandha
8.	Pota Bandha	17.	Balaka Bandha	25.	Maha Bandha
9.	Kalka Bandha				

Some considers Jalooka bandha as 26th Bandha.

1. Hata Bandha

हठो रसः स विज्ञेयः सम्यक्शुद्धिविवर्जितः। स सेवितो नृणां कुर्यान्मृत्युं वा व्याधिमुद्धतम्।। (R.R.S.11/65)

When Parada is converted into solid state, without subjecting into proper shodhana process, it is known as Hata bandha. This is not advised for the internal administration as its usage will cause death or severe diseases.

2. Arota Bandha

सुशोधितो रसः सम्यगारोट इति कथ्यते। स क्षेत्रकरणे श्रेष्ठः शनैर्व्याधिविनाशनः।। (R.R.S.11/66)

When Parada is converted into solid state, after subjecting into proper shodhana process, it is known as Arota bandha. This is considered to be best for kshetrikarana. Its judicious internal usage will cure all the diseases.

3. Abhasa Bandha

पुटितोयो रसो याति योगं मुक्त्वा स्वभावताम्। भावितो धातुमूलाद्यैराभासो गुणवैकृतेः। (R.R.S.11/67)

When Parada is mixed with metals and triturated with herbal juices or decoctions, then subjected to puta paka, it looses its original form and attains solid state, this is known as Abhasa bandha. It is named so because it attains changes in its quality i.e., Gunavaikruti. Specific therapeutic indication have not mentioned for this type of bandita Parada.

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4. Kriyaheena Bandha

असंशोधितलोहाद्यैः साधितो यो रसोत्तमः। क्रियाहीनः स विज्ञेयो विक्रियां यात्यपथ्यतः।। (R.R.S.11/68)

When purified Parada is converted into solid state by processing with unpurified metals and minerals, then is called kriyaheena bandha. If this Parada is administered internally without following proper pathya, it will harm the body.

5. Pishtika Bandha

तीव्रातपे गाढतरावमर्दात्पिष्टी भवेत्सा नवनीतरूपा। ख्यातः स सूतः किल पिष्टबन्धः सन्दीपनः पाचनकृद्विशेषात्।। (R.R.S.11/69)

When Parada is converted into pishti form by subjecting it to trituration intensively under the hot sun until it attains the appearance of butter, then it is known as Pishtika bandha. Such Parada when administered internally improves appetite and digests the food very quickly.

6. Kshara Bandha

शङ्खाभ्रकिवराटाद्यैर्योऽसौ संसाधितो रसः क्षारबन्धः परं दीप्तिपुष्टिकृच्छूलनाशनः। (R.R.S.11/70)

urified Parada is converted into solid form by triturating it with Shankha, rda and such other drugs, then it is called Kshara bandha. This Parada, te, nourishes the body and cures udara shoola.

7. Khota Bandha

बन्धो यः खोटतां याति ध्मातो ध्मातः क्षयं व्रजेत्। खोटबंधः स विज्ञेयः शीघ्रं सर्वगदापहः।। (R.R.S.11/71)

Khota bandha is that when Parada is converted into solid, round and pill like appearance by subjecting it into various process. After this Parada will have agnisthayi property where it does not evaporate or evaporates very slowly even when heated in intense fire. Such Parada when used internally can cure all types of diseases.

8. Pota Bandha

द्रुतकज्जालिका मोचापत्रके चिपिटीकृता। स पोटः पर्पटी सैव बालाद्यखिलरोगनुत्।। (R.R.S.11/72)

Pota bandha is that when the kajjali is melted, poured over the plantain leaf and pressed to make it into thin flakes like substances. This is also known as parpati which when used internally cures all the diseases of all ages starting from paediatrics to geriatrics.

9. Kalka Bandha

स्वेदाद्यैः साधितः सूतः पङ्कत्वं समुपागतः।। कल्कबद्धः स विज्ञेयो योगोक्तफलदायकः।। (R.R.S.11/73)

If the Parada is converted into the form resembling panka (mud) by subjecting it into swedana and other process, then it is called Kalka bandha. When such Parada is used with different formulations, it aids to exhibit all the ascertained benefits of the yogas.

10. Kajjali Bandha

कज्जली रसगन्धोत्था सुश्लक्ष्णा कज्जलोपमा। तत्तद्योगेन संयुक्त कज्जलीबन्ध उच्यते। (R.R.S.11/74)

When Parada is mixed with Gandaka and triturated until it becomes smooth and black coloured fine powder, it is known as kajjali bandha. The different formulations in which kajjali is mixed are also called kajjali bandha.

11. Sajeeva Bandha

भस्मीकृतो गच्छति बह्नियोगाद्रसः सजीवः खलु सम्प्रदिष्टः।
संसेवितोऽसौ न करोति भस्मकार्यं जरव्याधिविनाशनं च।। (R.R.S.11/75)

After bhasmikarana of Parada, if there is loss of Parada by heating, then it is known as Sajeeva bandha. This Parada if administered internally will not impart any therapeutic actions of bhasma and it does not possess the capability of removing jara (old age) and vyadhi (diseases).

12. Nirjeeva Bandha

जीर्णाभ्रको वा परिजीर्णगन्धो भस्मीकृतश्चखिललौहमौलिः।
निर्जीवनामा हि स भस्मसूतो निःशेषरोगान्विनिहन्ति वेगात्।। (R.R.S.11/76)

If bhasmikarana (incineration) of Parada is done after Abhraka jarana or Gandaka

CHAPTER EIGHT

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पुटितोयो रसो याति योगं मुक्त्वा स्वभावताम्। भावितो धातुमूलाद्यैराभासो गुणवैकृतेः। (R.R.S.11/67)

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When purified Parada is converted into solid state by processing with unpurified metals and minerals, then is called kriyaheena bandha. If this Parada is administered internally without following proper pathya, it will harm the body.

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तीव्रातपे गाढतरावमर्दात्पिष्टी भवेत्सा नवनीतरूपा। ख्यातः स सूतः किल पिष्टबद्धः सन्दीपनः पाचनकृद्विशेषात्।। (R.R.S.11/69)

When Parada is converted into pishti form by subjecting it to trituration intensively under the hot sun until it attains the appearance of butter, then it is known as Pishtika bandha. Such Parada when administered internally improves appetite and digests the food very quickly.

6. Kshara Bandha

शङ्खशुक्तिवराटाद्यैर्योऽसौ संसाधितो रसः क्षारबन्धः परं दीप्तिपुष्टिकृच्छूलनाशनः। (R.R.S.11/70)

When purified Parada is converted into solid form by triturating it with Shankha, Shukti, Kaparda and such other drugs, then it is called Kshara bandha. This Parada, increases appetite, nourishes the body and cures udara shoola.

7. Khota Bandha

बन्धो यः खोटतां याति ध्मातो ध्मातः क्षयं व्रजेत्। खोटबंधः स विज्ञेयः शीघ्रं सर्वगदापहः।। (R.R.S.11/71)

Khota bandha is that when Parada is converted into solid, round and pill like appearance by subjecting it into various process. After this Parada will have agnisthayi property where it does not evaporate or evaporates very slowly even when heated in intense fire. Such Parada when used internally can cure all types of diseases.

8. Pota Bandha

द्रुतकज्जालिका मोचापत्रके चिपिटीकृता। स पोटः पर्पटी सैव बालाद्यखिलरोगनुत्।। (R.R.S.11/72)

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9. Kalka Bandha

स्वेदाद्यैः साधितः सूतः पङ्कत्वं समुपागतः।। कल्कबद्धः स विज्ञेयो योगोक्तफलदायकः।। (R.R.S.11/73)

If the Parada is converted into the form resembling panka (mud) by subjecting it into swedana and other process, then it is called Kalka bandha. When such Parada is used with different formulations, it aids to exhibit all the ascertained benefits of the yogas.

10. Kajjali Bandha

कज्जली रसगन्धोत्था सुश्लक्ष्णा कज्जलोपमा। तत्तद्योगेन संयुक्त कज्जलीबन्ध उच्यते। (R.R.S.11/74)

When Parada is mixed with Gandaka and triturated until it becomes smooth and black coloured fine powder, it is known as kajjali bandha. The different formulations in which kajjali is mixed are also called kajjali bandha.

11. Sajeeva Bandha

भस्मीकृतो गच्छति बह्नियोगाद्रसः सजीवः खलु सम्प्रदिष्टः।
संसेवितोऽसौ न करोति भस्मकार्यं जरव्याधिविनाशनं च।। (R.R.S.11/75)

After bhasmikarana of Parada, if there is loss of Parada by heating, then it is known as Sajeeva bandha. This Parada if administered internally will not impart any therapeutic actions of bhasma and it does not possess the capability of removing jara (old age) and vyadhi (diseases).

12. Nirjeeva Bandha

जीर्णाभ्रको वा परिजीर्णगन्धो भस्मीकृतश्चखिललौहमौलिः।
निर्जीवनामा हि स भस्मसूतो निःशेषरोगान्विनिहन्ति वेगात्।। (R.R.S.11/76)

If bhasmikarana (incineration) of Parada is done after Abhraka jarana or Gandaka

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jarana, then such bhasma is called Nirjeeva bandha. This is superior to bhasmas of all metals and can cure all the diseases quickly.

13. Nirbeeja Bandha

रसस्तु पादांशसुवर्णजीर्णः पिष्टीकृतो गन्धकयोगतश्च।
तुल्यांशगन्धैः पुटितः क्रमेण निर्बीजनामा सकलामयघ्नः।। (R.R.S.11/77)

When Parada is mixed with one-fourth of swarna and processed into form of pishti by adding Gandaka and again by adding equal quantity of Gandaka and subjected to puta by giving gradual heat, then it is known as Nirbeeja bandha. This Parada bhasma when administered internally can cure all the diseases.

14. Sabeeja Bandha

पिष्टीकृतैरभ्रकसत्त्वहेमतारार्ककान्तैः परिजारितोयथः। हतस्ततः षड्गुणगन्धकेन स बीजबन्धो विपुलप्रभावः।।
(R.R.S.11/78)

Parada jarana is done with Abhraka satva, Swarna, Rajata, Tamra and Kantaloha to obtain pishti form. Later six times of Gandaka is added to this Pishti and subjected to puta to obtain bhasma. Such bhasma is called Sabeeja bandha and it possesses wide therapeutic application when administered internally.

15. Shrnkala Bandha

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व्रज्रादिनिहतः सूतो हत सूतः समोऽपरः शृङ्खलाबद्धसूस्तु देहलोहविधायकः।
चित्रप्रभावां वेगेन व्याप्तिं जानाति शंकरः।। (R.R.S.11/79)

When Parada bhasma which is prepared by adding Vajra and other Ratnas is homogeneously mixed with the equal quantity of Parada bhasma which is prepared by adding drugs other than Ratnas, this mixture is known as Shrunkala bandha. This Shrunkala baddha Parada is useful in both dehavada and lohavada purposes. Such Parada get absorbed quickly in the body and produces immediate effect on the body.

16. Dhruti Bandha

युक्तोऽपि बाह्यद्रुतिभिश्च सूतो बंन्धं गतो वा भसितस्वरूपः।
स राजिकापादमितो निहन्ति दुःसाध्यरोगान्द्रतिबद्धनामा।। (R.R.S.11/80)

When Parada is converted into solid form or bhasma form by adding bahyadhruti (dhruti prepared outside the Parada), then it is known as dhruti bandha. When administered internally at the dose of ¼th rajika, it will cure all the diseases including those which are difficult to cure.

17. Balaka Bandha

समाभ्रजीर्णः शिवजस्तु बालः संसेवितो योगयुतो जवेन। रसायनो भाविगदापहश्च सोपद्रवारिष्टगदान्निहन्ति।।
(R.R.S.11/81)

Parada after the jarana with equal quantity of Abhraka if converted into bhasma, then it is called balaka bandha. If such Parada is administered internally along with different formulations or anupanas, it acts like a rasayana and also prevents the diseases. It cures the diseases along with the upadravas (complications) and arishtas (fatal signs).

18. Kumara Bandha

हरोद्भवो यो द्विगुणाभ्रजीर्णः स स्यात्कुमारो मितनन्दुलोऽसौ।
त्रिःसप्तरात्रैः खलु पापयोगसंघातघाती च रसायनश्च।। (R.R.S.11/82)

Parada after the jarana with twice the quantity of Abhraka, if converted into solid or bhasma form, then it is known as kumara bandha. If such Parada is administered internally at the dose of tandula (rice) for 3 weeks, it cures the diseases caused due to sin (like kushta etc.,) and also acts like rasayana.

19. Taruna Bandha

चतुर्गुणव्योमकृताशनोऽसौ रसायनाग्र्यस्तरुणाभिधानः। स सप्तरात्रात्सकलामयघ्नो रसायनो वीर्यबलप्रदाता।।
(R.R.S.11/83)

Parada after the jarana with four times the quantity of Abhraka if converted into solid or bhasma form, then it is known as taruna bandha. Such Parada is best among all the rasayanas. If this Parada is administered internally, it cures all the diseases within 7 days, also acts as rasayana and promote veerya (virility) and bala (strength) to the body.

20. Vruddha Bandha

यस्याभ्रकः षड्गुणितो हि जीर्णः प्राप्ताग्निसंख्यः स हि वृद्धनामा।
देहे च लोहे च नियोजनीयः शिवादृते कोऽस्य गुणान्प्रवक्ति।। (R.R.S.11/84)

Parada after the jarana with six times the quantity of Abhraka is converted into bhasma which posses the property of agnisthayi (heat resistant), then it is known as vruddha bandha.

Such Parada is useful both for deha vedha and loha vedha purpose. The properties of such parada can explain only by shiva which means to say it bestows with immense quality.

21. Moorti Bandha

यो दिव्यमूलिकाभिश्च कृतोऽत्यग्निसहो रसः विनाऽभ्रजारणात् स स्यान्मूर्तिबन्धो महारसः।
अयं हि जार्यमाणस्तु नाग्निना क्षीयते रसः। योजितः सर्वयोगेषु निरौपम्यफलप्रदः।। (R.R.S.11/85-86)

If Parada is converted into solid form or bhasma which is highly thermostable, by using divya moolika oushadhis (celestial herbal drugs) and without the Abhraka jarana, then it is called as moorti bandha. This Parada does not reduce in quantity even by continuous heating. When administered internally with other formulations, it produces incomparable results.

22. Jala Bandha

शिलातोयमुखैस्तोयैर्बद्धोऽसौ जलबन्धवान्। स जरारोगमृत्युघ्नः कल्पोक्तफलदायकः।। (R.R.S.11/87)

If Parada is made into solid form by using shilatoya (special type of water prepared by boiling Haratala and Gandaka till the appearance of bubbles. Then it is cooled and watery part is collected which is known as shilatoya), then it is called jala bandha. Such Parada can eradicate jara (senility), roga (disease) and mrutyu (death). When it combines with various formulations, it helps to bestow the results.

23. Agni Bandha

केवलो योगयुक्तो वा ध्मातः स्याद्गुटिकाकृतिः। अक्षीणश्चाग्निबद्धोऽसौ खेचरत्वादिकृत्स हि।। (R.R.S.11/88)

When Parada alone or combined with other drugs like metals is heated by blowing fire and converted into gutika form and does not reduce on heating, then it is called agni bandha. This Parada is said to impart khecharatva (power to fly) and such other wonderful powers.

24. Susamskrutha Bandha

विष्णुक्रान्ताशशिलताकुम्भीकनकमूलिकैः। विशालानागिनीकन्दव्याघ्रपादीकुरूण्टकैः।।
वृश्चिकालीभशुण्डीभ्यां हंसपाद्यासहासुरः। अप्रसूतगवां मूत्रैः पिष्टं वा कुलके पचेत् ।।
पक्वमेवं मृतैर्लोहैर्मार्दितं विपचेद्रसम्। यन्त्रेषु मूर्च्छा सूतानामेष कल्पः सुसंस्कृतः।। (R.R.S.11/89-91)

A paste is prepared with the herbal drugs like Vishnukranta, Shashilatha, Kumbhi, Kanakamoola, Vishala, Nagini kanda, Vyaghrapadi, Kuruntaka, Vrschikali, Hastishundi, Hamsapadi, Saha and Asuri by grinding these with virgin cow's urine. Parada is mixed with this paste and bolus is prepared which is later placed in the valuka yantra and heated to yield bhasma. This bhasma is mixed with the bhasmas of other metals and treated in suitable yantras to achieve murcchana or bandhana. This is known as susamkrutha bandha. Therapeutic application for this bandha has been not mentioned.

25. Maha Bandha

हेम्ना वा रजतेन वा सहचरो ध्मातो व्रजत्येकताम्अक्षीणो निबिडो गुरुश्च गुटिकाकारोऽतिदीर्घोज्ज्वलः।
चूर्णत्वं पटुवत्प्रयाति निहतो घृष्टो न मुञ्चेन्मलं निर्गन्धो द्रवति क्षणात्स हि महाबन्धाभिधानो रसः।। (R.R.S.11/92)

When Parada is mixed either with Swarna or Rajata and heated to obtain an homogenous amalgam by which it get converted into solid form, then it is called as maha bandha. This Parada does not reduces on heating, it will be nibida (dense), guru(heavy), gutikakara (shape of the tablet), atideergha ujjwala (remains lustourous for longer time), when hit or hammered, it becomes powdered like salt, when rubbed on rough surface, does not leave any mala (blackish colour), nirgandha (odourless) and melts quickly.

26. Jalooka Bandha

In Rasa ratna samucchaya, it has mentioned that Jalooka bandha is the 26th bandha

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according to some Acharyas. It is not used for therapeutic purpose, it is used as a vaginal pessary to get quick orgasm in females.

सूते गर्भनियोजितार्थकनके पादांशनागेऽथवा पञ्चाङ्गुष्ठंकशाल्मलीकृतमदा श्लेष्मातबीजैस्तथा।
तद्वत्तेजिनिकोलकाख्यफलजैश्चूर्णं तिलं पत्रकं तप्ते खल्लतले निधाय मृदितै जाता जलूका वरा।। (R.R.S.11/93)

One part of Parada is subjected to jarana with ½ part of Swarna or ¼th part of Naga. Then to this jarita Parada, 1/16th part each of Eranda beeja, Shalmali beeja, Vijaya beeja, Slesmataka beeja, Jyotismati beeja, Kola beeja, Tila and Tejapatra are added and triturated in tapta khalwa yantra till it attains good jaluka shape.

बाल्ये चाष्टाङ्गुला योज्या यौवने च दशाङ्गुला। द्वादशैव प्रगल्भानां जलौका त्रिविधा मता।। (R.R.S.11/94)

There are three types jalukas based on its size. It is used in different aged females accordingly-

1. 8 Angula length- used in bala (teenaged girls)
2. 10 Angula length- used in young women
3. 12 Angula length- used in middle aged women

Properties and Therapeutic Uses

Rasa	Shadrasa
Guna	Snigdha , Sara and Guru
Doshaghnata	Tridoshaghna
Karma	Yogavahi, Rasayana, Ativrishya, Balya, Vajikara, Vayastambhakara, Pustikara, Krimighna and Buddhi Smriti Kantiprada
Prayoga	Krimi, Kushta, Akshi roga, Vata roga, Vali palita roga, Tridoshaja roga and Sarvaroga

Important Formulations (Yogas)

1.	Kajjali
2.	Soothashekhara Rasa
3.	Rasa Parpati
4.	Panchamrita Parpati
5.	Rasa sindoora

6.	Rasa Karpoora
7.	Rasa Pushpa
8.	Brhit vata chintamani Rasa
9.	Rasa Pottali
10.	Hiranya Garbha Pottali

Research Updates

1. T. Venkateshwar et al, **Physico - Chemical Study of Different Methods of Parada Samanya Shodhana,** Int. J. Ayur. Pharma Research 2014; 2 (1): 55-67

Based on the observations made during the collections of the samples and carrying out the purificatory procedures of Mercury and also the analytical study, it can be concluded that All selected purificatory methods are effective in reducing the

lead content in Mercury. Except the process in which Mercury is triturated with Haridra churna and Kumari swarasa, all selected purificatory procedures are effective in reducing tin contents in Mercury.

2. Sanjay Khedekar et al, **Role of Gandhaka Jarana in the Mercurial preparations of Indian Medicinal Alchemy (Rasashastra).** J Res Educ Indian Med. 2017; 23(3-4):

Gandhaka Jarana having definite role in the mercurial preparations. The screened and reviewed studies showed that increase in number and quantity of Gandhaka Jarana induces major differences in the finished mercurial products. Rasasindura prepared Samaguna Gandhaka Jarana and Shadguna Gandhaka Jarana shows major difference in the analysis of finished product. Analytical studies of Makaradhwaja revealed that Makaradhwaja prepared by Triguna Balijarana shows 300.1 ppm of gold in finished product, whereas 12131 ppm of gold in Shadguna Balijarita Makaradhwaja. Scholars have also mentioned that increase in the number of Gandhaka Jarana of Makaradhwaja reduces the concentration of Parada (Mercury) in the finished product. Clinical and experimental studies of the same products also indicate that increase in number of Gandhaka Jarana increases the efficacy of product. All reviewed studies in different aspects viz. analytical, experimental, and clinical shows that Gandhaka Jarana has a definite role in the mercurial medicinal preparations.

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Abhraka (Biotite, Mica)

Abhraka has got prime importance among minerals and placed first in Maha rasa vargas. Abhraka is considered as a main drug in many samskaras of parada. Use of Abhraka patra, Abhraka satwa in the process of parada jarana is found in many texts.

Synonyms

अभ्रकं गगनं भृङ्गमभ्रं खं व्योमनामकम्। वज्रं घनञ्च गिरिजं बहुपत्रमनन्तकम्।।
आकाशमम्बरं शुभ्रं त्वमलं गरजध्वजम्। मेघाख्यमन्तरिक्षञ्च तदेव परिकीर्तितम्।। (R.T.10/1-2)

Abhraka	Gagana	Bhrnga	Abhra	Kha
Vyoma	Vajra	Ghana	Girija	Bahupatra
Anantaka	Akasha	Ambara		Amala
Garajadhwaja	Megha	Antariksha	Abdam	Ajaram
Amruta	Khechara	Girijabeejam	Girijamala	Nirmala
Bheka	Patala	Shubhra	Gouriteja	Akashavachi

Vernacular Names

1.	Latin : Mica
2.	English : Glimmer
3.	Hindi : Abhrak

4.	Sanskrit : Abhra
5.	Kannada : Kaage bangara

Minerological Identification

Mica is a generic term applied to a group of complex alumino silicate minerals having a sheet or plate like structure with different composition and physical properties. All mica form flat six-sided monoclinical crystals with a remarkable cleavage in the direction of large surfaces, which permits them to split easily into optically flat films. When split into thin films, they remain tough and elastic even at high temperature. Mica possesses some of the most outstanding combinations of chemical, physical, electrical, thermal and mechanical properties which are not found in any other mineral.

Chemical Composition	K(Mg, Fe) 3 (Si3 Al011) (OH)2
Colour	Purple, rosy, silver, gray (lepidolite), dark green, brown, black (biotite), yellowish-brown, green-white (phlogopite), colorless, transparent (muscovite)
Luster	Pearly, vitreous
Crystal habit	Monoclinic, with a tendency towards pseudohexagonal Crystals
Cleavage	Almost perfect
Specific Gravity (gm/cmu)	2.8- 3.0
Diaphaneity	Transparent (muscovite), Translucent (lepidolite, phlogopite), Opaque (biotite)
Hardness (Moh's Scale)	2.5-4 (lepidolite), 2.5-3 (biotite, phlogopite), 2-2.5 (muscovite)
Fracture	Flaky
Streak	White, colorless

Chemical Composition: Silica (SiO_2) 43 to 48%, Aluminia (Al_2O_3) 33 to 37%, Potash (K_2O) 8 to 12%, Ferric Oxide (Fe_2O_3) 1.5 to 3%, Calcium Oxide (CaO) 0.1 to 0.5%, Magnesia (MgO) 0.1 to 1%, Titanium Oxide (TiO_2) 0.5 to 0.7%, Manganese (MnO_2) Trace, Sodium Oxide (Na_2O) 0.5 to 1.5%, Phosphorous (P) 0.02 %, Sulphur (S) 0.01%.

Sources and Occurrence

Mica is a common rock forming mineral, widely distributed and occurs in igneous, metamorphic and sedimentary regimes. In India, it is available in Bhilwara, Rajasamand, Ajmer and Tonk districts of Rajasthan; Nellore and Salem districts of Tamil Nadu: Noorpur district of Punjab, Almod district of Uttar Pradesh and Hazaribagh district of Bihar, also in Madhya Pradesh and Karnataka state.

Though India is the largest producer of Mica in the world, it is also produced in large quantities in a few other countries like Angola, Australia, Argentina, Brazil, Madagascar, Southern Rhodesia, Union of South Africa, U.S.A., Tanganyika.

Types

1. Based on its response towards heating

पीनाकं नागमण्डूकं वज्रमित्यभ्रकं मतम्। श्वेतादिवर्णभेदेन प्रत्येकं तच्चतुर्विधम्।। (R.R.S. 2/4)

पिनाकनागमण्डूकवज्राह्वयविभेदतः। चतुर्विधन्तु कृष्णाभ्रं मतं रसविशारदैः।। (R.T.10/4)

Depending on the behaviour towards fire, Abhraka is divided into 4 types as

1. Pinaka 2. Naga 3. Manduka 4. Vajra

In Rasaratna samuchaya and Rasendra chudamani, authors have sub classified each variety into 4 types which in total becomes 16 types. Where as Rasa Taranginikara and Ayurveda prakasha author have included Pinaka, Naga, Manduka, Vajra as the varieties of Krishnabhraka. In Rasarnava and Rasendra sara sangraha, mandukabhraka is replaced by Dardurabhraka and other three varieties are mentioned as the same.

1. Pinakabhraka

पिनाकं पावकोत्तप्तं विमुञ्चति दलोच्चयम्। तत्सेवितं मलं बध्वा मारयत्येव मानवम्।। (R.R.S. 2/5)

On heating, the Pinakabhraka layers get separated. If it is consumed, it leads to death, causing severe constipation.

As per Rasendra sara sangraha, Rasarnava on heating, it produces 'chit chit' sound and consumption of this Abhraka causes kusta.

2. Nagabhraka

नागाभ्रं नागवत्कुर्यात् ध्वनिं पावकसंस्थितम्। तद्भुक्तं कुरुते कुष्ठं मण्डलाख्यं न संशयः।। (R.R.S. 2/6)

Nagabhraka when heated, creates a sound that resembles hissing of enraged snakes and causes mandala kusta if consumed, without any doubt.

As per the author of Rasarnava and Rasa Tarangini, consumption of Nagabhraka also leads to bhagandara like diseases.

3. Mandukabhraka

उत्प्लुत्योत्प्लुत्य मण्डूकं भ्रामं पतति चाभ्रकम् । तत्कुर्यादश्मरीरोगमसाध्यं शस्त्रतोऽन्यथा।। (R.R.S.2/7)

Mandukabhraka, on heating get thrown out which resembles the jumping of frogs. Its consumption causes incurable ashmari roga, which can be treated only with surgical measures.

In Rasarnava, it is explained as, if heated it produces the sound similar to the sound produced by the Kukkuta, its intake will lead to death.

4. Vajrabhraka

वज्राभ्रं वह्निसन्तप्तं निर्मुक्ताशेषवैकृतम्। देहलोहकरं तच्च सर्वरोगहरं परम्।। (R.R.S.2/8)

Vajrabhraka, when heated does not exhibit any of the characters. It remains as it is and shows no obvious changes. When consumed, it strengthens the body like iron and destroys all the diseases.

As per author of Rasarnava this is used for rasa and rasayana karma. According to Rasatarangini, Vajrabhraka is the best variety among all types of Abhraka and its proper usage will cure all the maharogas and it destroys aging and helps to maintain the young look.

II. Based on its Colour

श्वेतं रक्तं च पीतं च कृष्णमेवं चतुर्विधम्। श्वेतं श्वेतक्रियासूक्तं रक्ताभं रक्तकर्मणि।
पीताभमभ्रकं यत्तु श्रेष्ठं तत्पीतकर्मणि।। चतुर्विधं वरं व्योम यद्यप्युक्तं रसायने।
तथाऽपि कृष्णवर्णाभ्रं कोटिकोटिगुणाधिकम्।। (R.R.S. 2/9-10)

Depending upon the colour, each one is classified into 4 types:

S.No	Types	Uses	Therapeutic property
1	Shweta	Shweta karma (converting lower metals into silver)	Cures Shweta Kushta
2	Rakta	Raktakarma imparting red colour to a metal	Cures Pandu
3	Peeta	Peetakarma (converting lower metals to gold)	Cures Kamala.
4	Krishna	Excellent qualities by crores of times than other Varieties	Best Rasayanas.

III. Based on the Varna

ब्रह्मक्षत्रियवैश्यशूद्रभेदात्तत्स्याच्चतुर्विधम्। क्रमेणैव सितं रक्तं पीतं कृष्णं च वर्णतः।। (A.P. 2/91)

There are 4 types of Abhraka based on the colour:

1. Brhamana- Shweta
2. Kshatreeya - Rakta
3. Vaishya - Peeta
4. Shudra - Krishna

IV. According to Udbhava Sthana

अभ्रकं हिमशैलोत्थमुत्तमं परिकीर्तितम्। मध्यमं पूर्वशैलोत्थं त्वधमं दक्षिणाद्रिजम्।। (R.T.10/14)

Based on its origin, it has been categorized as

1. Uttara Shailotha
2. Poorva Shailotha
3. Dakshina Shailotha

These are Uttarottara Shreshta.

V. According to the System of Mineralogy by Dana

According to the 'System of Mineralogy' by Dana,

1. Muscovite - Potassium Mica [$H_2KAl_3(SiO_4)_3$]
2. Paragonite - Sodium Mica [$H_2NaAl_3(SiO_4)_3$]
3. Lepidolite - Lithium Mica [$(OH, F)_2$ $KLiAl_2$ Si_3O_{10}]

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4. Zinnwaldiet - Lithium iron Mica [$(Li_2K_2Fe_2Al_4Si_7O_{24}$]
5. Biotite - Magnesium iron Mica [$H_2K(Mg, Fe)_3Al(SiO_4)_3$]
6. Phlogopite - Magnesium Mica - usually containing fluorine free from iron [$H_2KMg_3Al(SiO_4)_3$]
7. Lepidomelane - Iron Micas containing ferric iron in large amount [$(H_2K)Fe_3(Al, Fe)(SiO_4)_3$]

Grahya Lakshana

स्निग्धं पृथुदलं वर्णसंयुक्तं भारतोऽधिकम्। सुखनिर्मोच्यपत्रं च तदभ्रं शस्तमीरितम्।। (R.R.S.2/11)

नीलाञ्जनोपमं स्निग्धं भारपूर्णं महोज्जवलम्। निर्मोच्यपत्रं मृदुलं त्वभ्रं श्रेष्ठमिहोच्यते।। (R.T.10/13)

Abhraka possessing the following qualities is said to be the best one:

1. Snigdha- Unctous.
2. Pruthudala- Broad and large separable layers.
3. Varna samyuktha/Neelanjanopamam- Better (black like neelanjana) colour.
4. Adhika bhara/Bhaara purna- Heavy in weight.
5. Sukha nirmocha patra- Layers should be easily separable.
6. Mahojwalam- Bright and lustrous.
7. Mrudu- Soft to touch.

राजहस्तादधः स्तद्यत्समानीतं घनं खनेः भवेत् तदुक्तफलदं निःसत्त्वं निष्फलं परम्।। (R.R.S. 2/3)

Abhraka which is mined from the depth of one rajahasta is said to have good medicinal properties than the Abhraka available on the surface of the earth which is devoid of essence and useless.

In Bhavaprakasha, it is said as Abhraka available in northern mountains have more essence and best in properties than that available in mountains of southern part.

Ashuddha Abhraka Dosha

बाधां विदध्याद्विविधां शरीरे हृत्पार्श्वपीडां तनुते नितान्तम्।
शोफं क्षयं पाण्डुगदञ्च कुष्ठं त्वशोधिताभ्रं खलु मारितं यत्।।
धान्याभ्रकरणे चैव मारणे सत्त्वपातने च। रसतन्त्रविशेज्ञः शुद्धमभ्रं नियोजयेत्।। (R.T.10/16-17)

Ingestion of Abhraka bhasma, incinerated using Ashuddha Abhraka, leads to serious health injuries. It causes :

1. Shareera bhadha (Continuous pain in different parts of the body).
2. Hritparswa peeda (Pain in cardiac and flank region).
3. Shopha (Oedema).
4. Kshaya (Wasting disorders like Tuberculosis).

5. Pandu gadha (Anaemia).
6. Kushta (Skin diseases).

Therefore Rasavaidyas should use Shuddha Abhraka for the preparation of Dhanyabhraka, for Marana and for Satwapatana.

Pancha Samskara of Abhraka

संस्कारः पञ्चधा प्रोक्तो घनस्य परमेश्वरि!। धान्यभ्रकरणं सत्त्वपातनं निर्मलक्रिया।।
सुमृतीकरणं चैव त्वमृतीकरणं तथा। मारणे घनसत्त्वस्य घनपत्रस्य मारणे।। (A.K.1/151)

The five samskaras of Abhraka are-

1. Abhraka nirmalakriya (Shodhana of Abhraka patra and Abhraka satwa).
2. Dhanyabrakarana (Preparation of Dhanyabraka from Abhraka patra).
3. Sumrutikarana (Incineration of Dhanyabhraka and Abraka satwa).
4. Amrutikarana.
5. Satwapatana (Extraction of Satwa from Abhraka).

Shodhana:

प्रतप्तं सप्तवाराणि निक्षप्तं काञ्जिकेऽभ्रकम्। निर्दोषं जायते नूनं प्रक्षिप्तं वाऽपि गोजले।।
त्रिफलाक्वथिते चापि गवां दुग्धे विशेषतः। (R.R.S.2/16-17)

By heating Abhraka strongly to red hot and immersing it in Kanji for seven times, it will become devoid of its blemishes. Similarly the well heated Abhraka is dipped in Gomutra or Triphala qwatha or Godugdha to purify it.

S.No.	Method of Shodhana	Drugs used	Reference
1	Nirvapa-7 times	Kanji/Gomutra	R.R.S. 2/16-17
2	Nirvapa-7 times	Godughda/Triphala Kwatha	R.R.S. 2/16-17 R.T. 10/20

Dhanyabhraka

It is an intermediate process done in between Shodhana and Marana procedure described only for Abhraka. In this process, Abhraka becomes fine powder coming in contact with the sharp edges of the paddy, this fine powder is necessary to prepare chakrikas for marana process. Physical impurities of Abhraka left after shodhana are separated and it would be helpful for easy assimilation into the body.

चूर्णाभ्रं शालिसंयुक्तं वस्त्रबद्धं हि काञ्जिके। निर्यातं मर्दनाद्वस्त्राध्दान्याभ्रमिति कथ्यते।। (R.R.S. 2/21)
पादांशशालिसंयुक्तमभ्रकं कम्बलोदरे। त्रिरात्रं स्थापयेत् नीरे तत् क्लिन्नं मर्दयेद्दृढम्।।
कम्बलाद्गलितं श्लक्ष्णं वालुकारहितञ्च यत्। तद्धान्याभ्रमिति प्रोक्तमभ्रमारणसिद्धये।। (R.Sa.Sa. 1/154)

One part of Shuddha Abhraka and one fourth part of shali dhanya are mixed well and kept in a Kambali (woolen blanket) and tied. Later it is immersed in a container containing kanji for 3 days. After 3 days, the Kambali is rubbed vigorously by which

fine particles of Abhraka are collected into the liquid, disintegrated by sharp edges of paddy through the fine pores of the cloth. The hard and stony particles remain inside due to their unchanged shape. These fine particles are called as dhanyabhraka which are useful for the marana process.

Marana

There are many methods described in our classics for the incineration of Abhraka. Some of them are:

I. Method

धान्याभ्रं कासमर्दस्य रसेन परिमर्दितम्।
पुटितं दशवारेण म्रियते नात्र संशयः।
तद्वन्मुस्तारसेनापि तण्डुलीयरसेन च।। (R.R.S.2/22)

Dhanyabhraka is triturated with Kasamarda Rasa in Khalwa yantra and Chakrikas are prepared. After drying of these Chakrikas, they are confined within the Sharava additional samputa and subjected to Gajaputa. Likewise the same procedure repeated for 91 times. After 10 Gajaputa, Abhraka becomes Bhasma undoubtedly. Similarly Abhraka bhasma can be prepared by triturating Dhanyabhraka with Musta Rasa or Tanduliya Rasa and subjecting it for Gajaputa.

II. Method-(Shataputi)

क्षीरत्रयं काकमाचीद गोक्षुरः खरमञ्जरी। वटप्ररोहो गोमूत्रं तुलसी कदलीशिफा।।
एभिरभ्रं विमर्द्याथ दशवारं पृथक् पृथक्। पुटेत्पुटविधानज्ञः क्रमेणैव भिषग्वरः।।
शतधा पुटनादेवं रक्तोत्पलसमप्रभम्। निश्चन्द्रं जायते भस्म सर्वदोषविवर्जितम्।। (R.T.10/43-44)

Dhanyabhraka is given Bhavana with Ksheera traya (Arka ksheera, Snuhi ksheera and Vata ksheera), Kakamachi Rasa, Gokshura kwatha, Apamarga swarasa, Vata praroha Rasa, Gomutra, Tulasi swarasa and Kadali jala separately for 10 times in each liquids and subjected to Puta each time after Bhavana. These 100 putas will yield the Abhraka bhasma which is non lusturous, red in colour and destroys all dosha.

S.No	Drugs used	No. and Type of Puta	Reference
1	Kasamarda Rasa/Musta Rasa/Tanduliya Rasa- For Bhavana	10 Gajaputa	R.R.S. 2/22
2	Equl quantity Guda; Eranda patra Rasa- For Bhavana	3 Gajaputa	R.R.S. 2/26
3	Arka ksheera/Arka moola Rasa- For Bhavana + Nyagrodha Moola Kwatha Bhavana + Kadali Rasa Bhavana	7 Gajaputa 3 Gajaputa 7 Gajaputa	R.T.10/39-42

4	Ksheera traya, Kakamachi Rasa, Gokshura kwatha, Apamarga swarasa, Vata praroha Rasa, Gomutra, Tulasi swarasa and Kadali jala- 10 Bhavanas in each liquids	100 Gajaputa	R.T. 10/43-44

Abhraka Bhasma Lakshana

निश्चन्द्रश्चारुणं स्वच्छं सुसूक्ष्मं स्पर्शकोमलम्। अभ्रं मृतं विजानीयाद्रसतन्त्रविचक्षणः।। (R.T. 10/55)

If Abhraka is incinerated properly, then Abhraka bhasma should posses following properties:

1. Nischandra (Non lustrous)
2. Aruna (Red in colour)
3. Swachcha (Clean)
4. Susookshma (Super fine)
5. Sparsha komala (Soft to Touch)

Amriteekarana

मारितं त्वतियत्नेन दशभागिकमभ्रकम्। त्रिफलाक्वथितं चैव नवं षोडशभागिकम्।।
गागभागिकमुत्राज्य दत्वा लोहस्य भाजने। पाचनाज्जायते रम्यममृतीकरणं वरम्।। (R.T.10/68-69)

In this process, 10 parts of Abhraka bhasma and 16 parts of decoction of Triphala is taken in an iron pan along with 8 parts of Goghrita and heated in low temperature till the liquid evaporates. There after it is allowed to cool.

कन्याम्बुमेघगव्याज्यं कलादिक्तपनांशकम्। पचेन्मन्दानलेनैतदमृतीकरणं वरम्।। (R.T.10/70)

Apart from triphala kwatha, kumari swarasa, can be used for this Amruteekarana process of Abhraka (Kumari swarasa - 16parts, Abhraka - 10parts, Goghrita - 12 parts).

मृताभ्रसंमितं गव्यमाज्यं दत्वाभ्रकं पचेत्। अमृतीकृतमेवन्तु घनं कार्येषु योजयेत्।। (R.T.10/71)

Amruteekarana of Abhraka can also be performed by using equal parts of Goghrita and Abhraka bhasma heated together till the liquid part evaporates.

अरुणभस्मस्तु पुनरमृतीकरणेन गुणवृद्धिर्वर्णहानिश्च भवति। (A.P.2/135)

By Amruteekarana, Abhraka bhasma becomes more potent, mridu and snigdha, but it loses its natural colour and becomes black.

To regain the natural colour of Abhraka bhasma, another process is done known as Lohiteekarana.

Lohiteekarana

गोङ्गेरुकी भद्रमुस्ता वटक्षीरन्तथैव च। वटमूलजलं वापि हरिद्राया द्रवस्तथा।
समङ्गाक्वथितश्चैव घनमेभिः सुपेषयेत्। पुटद्वयं त्रयं वापि वितरेद्भिषजां वरः।।
निश्चन्द्रिकञ्च मृदुलं रक्तोत्पलसमप्रभम्। गगनस्य भवेद्भस्म ततः कार्येषु योजयेत्।। (R.T.10/65-67)

In this process, Abhraka bhasma is triturated with any of the following liquids- Gangeruki kwatha or Bhadramusta kwatha or Manjista kwatha or Vatamoola swarasa,

Vata ksheera, or Haridra swarasa/kwatha or Lajjalu kwatha in a Khalwa yantra. Small chakrikas are made and dried under sunlight. They are kept in sharava samputa and subjected to Gajaputa. The same procedure is repeated for 2 to 3 times. At the end, Abhraka bhasma attains the colour or petals of red lotus, becomes non lustorous and smooth. This Abhraka bhasma can be used for specific purposes.

Probable Physico-chemical Changes During Above Processing

During Abhraka Shodhana by Nirvapa method, tension might increased in matter by application of heat, causing linear expansion. After heating, immediate cooling in liquid media leads to decrease in tension and increase in compression force. Repetition in heating and cooling causes disturb in compression tension equilibrium leads to increased brittleness, cracks on the flake surface thus breaking of the material i.e. reduction in hardness and finally reduction in particle size.

The process of Dhanyabhraka results in uniformly fine powder form with decreased lustre. The procedure reduces the elasticity and sharpness of the edges of the Abharka patras.

During the process of marana, Jaggery is added in equal proportion to that of Dhanyabhraka. This jaggery acts as an oxidizing agent in the incineration. Then by the process of Bhavana, Dhanyabhraka and other dravyas are triturated with liquid media in between surface of mortar and pestle. This process involves breaking down of material by rubbing action between two surfaces to produce small particles. Also, due to the repetition of Puta process leads to more reduction in particle size. After Marana, metals generally convert to their compound forms, which are biologically acceptable to the body. The process of Marana increases fineness of the bhasma, brings about changes in the structure, composition, arrangement of molecules and thus formation of newer compounds.

Thermodynamics of Puta

Different kind of Laws can be used for explaining the thermodynamics of puta. By using Mechanism of conduction of heat flow in puta can be explained. When there is a temperature gradient, Heat flows from a hot surface to a cold surface. Fourier's law can be used to explain the conduction of heat through the pellet. The area and the temperature gradient is proportional to the rate of heat flow through a uniform material. So the shape of pellets is very much important. It should be flat in shape, and thickness must be standard to facilitate the easy flow of heat. Hess's law of thermodynamics can be used to explain the exchange of heat from the puta to the pellets placed inside the sharava samputa. The process takes place in one or several steps, but the amount of heat evolved or absorbed in a chemical change is the same. Through several chemical changes taking place in the material inside the puta, it gets changed into compound

form. It had been shown by the studies that the energy of heat absorbed by the material and the energy required for the chemical change are the same inside the earthen plate during putapaka.

Amriteekarana procedure might involve the process of carbon reduction. Organic matter present in the herbal drugs and ghee could act as a source of carbon. The carbon reduction process could reduce any unstable metallic compound (especially oxides) to the stable state, Therefore, this process might have crafted to make Abhraka Bhasma more stable chemically as well as therapeutically.

In the lohitikarana process, the Abhraka bhasma is done bhavana with the drugs of Rakta varga dravya, which helps in giving red colour to the bhasma. Rakta varga dravyas are specially used in lohitikarana as they contain Anthocyanins, a chemical constituent which helps in imparting red colour. The Rakta varga dravyas like Vataksheera contains Leucoanthocyanin and Lajjalu contains Leucoanthocya- nidin, which helps in imparting red colour to Abhraka bhasma in the process of Lohitikarana.

Importance of temperature on structural alterations during processing of Abhraka

The enhancement of golden lustre and reddish colour of heated biotite mica with repeated heating reflects the increased extent of oxidation. Further, the brittle nature indicates that the interlayer bonds had weakened upon thermal exposure. Brittleness is developed mainly by raising compressive stresses within the mineral structure, which increases the volume during oxidation. The stresses lead to the development of cracks and spallations in the micaceous plates and facilitate the penetration of organic liquids—herbal extracts used during the drug preparation, decoctions, neat extracts of fruits etc. - in the mixture into the inner layers of mica. Thermal oxidation of biotite results in chemical and structural alterations which in turn aids to obtain fine drug particles which can be absorbed more easily by the human body. Spectroscopic and thermal data obtained from the biotite mica samples showed decomposition of the mineral at several stages. At the initial stage biotites were thermally modified by reacting with oxygen in the surrounding air.

$$Fe^{2+} \text{ octahedral} + OH^- \text{ octahedral} + \tfrac{1}{4}\, O_2 \text{ air} \rightarrow Fe^{3+} \text{ octahedral} + O_2^- \text{ octahedral} + \tfrac{1}{2}\, H_2O \text{ (up to 400 °C)}$$

At the same time, a redox reaction takes place between hydroxyls attached to the octahedral cations within the structure and the octahedral Fe^{2+} ions, causing expulsion of structural hydrogen and oxidation of further ferrous ions to ferric ions. Hydrogen may diffuse towards the edges of biotite plates and gets oxidized to water molecules when in contact with the organic liquids during the drug preparation.

$$Fe^{2+} \text{ octahedral} + OH^- \text{ octahedral} \rightarrow Fe^{3+} \text{ octahedral} + O2^- \text{ octahedral} + \tfrac{1}{2}\, H2$$

Remaining hydroxyls in octahedrons detach from the structure and are completely

removed as water molecules at temperatures above 800 °C. Further, it causes the creation of anion vacancies within the structure and leads to exfoliation of original single sheets of mica into much thinner units.

$$2(OH^-)\text{octahedral} \rightarrow (+ O_2^-)\text{octahedral} + H_2O \text{ (anion vacant site)}$$

As the Fe2+ ions in octahedrons are largely converted to the relatively smaller Fe3+ ions upon repetitive heating, octahedron positions get shrunk with developing cation vacancies. To keep the charge balances in the oxidized layers, some of the Fe3+ ions are ejected out from the biotite mica structure. Therefore, heating leads to buckle the existing octahedrons. The remaining octahedral ions such as Al3+ are expulsed consequently facilitating the transformation to stable ditrigonal arrangement of silicates.

$$3(Fe^{2+})\text{octahedral} \rightarrow (+ 2Fe^{3+})\text{octahedral} + Fe\downarrow \text{ (cation vacancy in octahedral site)}$$

Due to the charge imbalances created by the repetitive thermal oxidation in adjacent layers, structural components would collapse and produce secondary materials of biotite mica.

Thus, ion oxides dissected from the biotite structure are found as fine amorphous residues and microcrystalline magnetite and hematite phases. Further, the distortion of silica tetrahedral layers indicated by the FTIR studies confirms the above arguments. Thus, the rearrangement of secondary silicates and reduction of particle size into nanoscale dimension are possible upon heating during mica drug preparation. Since fine particles and amorphous materials can increase the availability of metallic constituents, extensive heating is conducive to both destruction of mineral structure of biotite and production of materials that can easily extract nutrients. (Wijenayake A, Pitawala A, Bandara R, Abayasekara C. Characterization of biotite drugs used in traditional medicine. Heliyon. 2020 Jul 29;6(7):e04483)

Properties and Therapeutic Uses

गौरीतेजः परममभृतं वातपित्तक्षयघ्नं प्रज्ञा बोधि प्रशमितरुजं वृष्यमायुष्यमग्र्यम्।
बल्यं स्निग्धं रुचिदमकफं दीपनं शीतवीर्यं तत्तद्योगैः सकलगदहृदयोम सूतेन्द्रबान्धि।। (R.R.S. 2/2)

अभ्रं स्निग्धं परमशिशिरं स्वादु चायुष्यमग्र्यं। केश्यं वर्ण्यं रुचिकरमलं दीपनं चातिबल्यम्।।
नेत्र्यं मेध्यं जनयतितरां स्तन्यसम्वर्द्धनञ्च। क्षेत्रे स्थैर्य्यं वितरति परं दीपनं पुष्पकेतोः।।
क्षिप्रं घोरां दलयति महारोगसंघातभीतिं। स्वान्ते प्रीतिं जनयति परं नर्महासे च यूनः।
देहे शक्तिं वितरतितरां बह्वपत्यप्रदात्रीं। कार्यालस्यं हरति सुतरामभ्रकं सेव्यमानम्।। (R.T. 10/72-74)

Rasa	Madhura
Guna	Snigdha
Veerya	Sheeta
Vipaka	Madhura
Doshaghnata	Vata Pittahara, Tridoshaghna

Karma	Rasayana, Vrshya, Ayushya, Balya, Deepana, Sarvarogahara, Sutendra bandhi, Keshyam, Varnyam, Ruchikara, Netrya, Medhya, Sthanya, Sthairyakara
Prayoga	Sarvaroga depending on different Anupanas

Dose: 1-2 ratti, 2-3 times a day

Anupana: Ghrita, Madhu, Navanita, Dugdha

Abhraka Satwapatana

पादांशटङ्कणोपेतं मुसलीरसमर्दितम्। रुन्ध्यात्कोष्ठ्यां दृढं ध्मातं सत्त्वरूपं भवेद्घनम्।। (R.R.S.2/26)

Shuddha Abhraka (1 Part) is mixed with ¼th Part of Tankana and done mardana with Musali Rasa. After making it into small balls or Chakrikas, it is dried and confined in Satwapatana Koshti. In Koshti, it is provided with intense heat, by which Satwa get extracted out of Abhraka.

Abhraka Satwa Shodhana

त्रिफलासलिले वापि वटमूलकषायतः। अम्लेन काञ्जिकैर्वापि खसत्वं शोधयद्भिषक्।। (R.T. 10/103)

Abhraka satwa is heated to red hot and immediately dipped in Triphala kwatha or Vatamoola kwatha or any Amla dravas or Kanji for seven times in any one of the dravas. This will purify the Abhraka satwa.

Abhraka Satwa Marana

द्वौ भागौ घनसत्त्वस्य भागश्च रसगन्धयोः। श्लक्ष्णपिष्टं ततः कृत्वा सप्तवारं प्रयत्नतः।।
गोमयाग्नौ पचेत्प्राज्ञः खसत्वस्य मृतिर्भवेत्। एवं मृतं व्योमसत्वं वीतशङ्कः प्रयोजयेत्।। (R.T. 10/110-111)

Two parts of Abhraka satwa mixed with one part of Samaguna Kajjali and triturated in Khalwa yantra till it becomes fine and smooth powder. Later it is confined in the Sharava samputa and subjected to Gajaputa for 7 times. This will yield the Abhraka satwa bhasma which can be used therapeutically for all purposes without any doubt.

Abhraka Satwa Bhasma Properties

अभ्रसत्वं सुशिशिरं मधुरं रुचिरं परम्। सुस्निग्धं केश्यमायुष्यं त्रिदोषघ्नं रसायनम्।। (R.T.10/112)

दिव्यभ्रं क्षयपाण्डुरुग्ग्रहणिकाशूलामकुष्ठामयम्। जूतिं श्वासगदं प्रमेहमरुचिं कासामयं दुर्धरं।।
मन्दाग्निं जठरव्यथां विजयते योगैरशेषामयान्।। (R.R.S.2/50-51)

Rasa	Madhura
Guna	Snigdha
Veerya	Sheeta
Vipaka	Madhura
Doshaghnata	Tridoshaghna

Karma	Rasayana, Ayushya, Deepana, Keshyam, Varnyam, Ruchikara.
Prayoga	Kshaya, Pandu, Shoola, Amavata, Kushta, Jwara, Shwasa, Prameha, Aruchi, severe Kasa, Mandagni, Udara

Abhraka Satwa Bhasma Matra and Anupana

वेल्लव्योषसमन्वितं घृतयुतं वल्लोन्मितं सेवितं। (R.R.S.2/50)

Matra: 1 Valla (3 Ratti - 375 mg)

Anupana: Trikatu, Vidanga and Ghrta

Management of Ashuddha, Apakwa and Avidhee Sevanajanya Dosha of Abhraka

उमाफलं जले पिष्टा सेवते यो दिनत्रयम्। अशुद्धाभ्रकदोषेण विमुक्तः सुखमेधते।। (R.J.N)

Atasi beeja by grinding it with water, if administered for three days, then the illeffects caused by the Abraka will get passified.

Pathya-apathya

क्षाराम्लविदलं कोलं कर्कटी कारवेल्लकम्। वृन्ताकं च करीरं तैलं चाभ्रे विवर्जयेत्।। (A.P.2/140)

Kshara, Amla, Vidala Anna, Kola, Karkati, Karavellaka, Vrunthaka, Karira and Taila should be avoided during the usage of Abhraka

Important Formulations (Yoga)

1. Arogyavardini Vati
2. Panchamruta Parpati
3. Swasakasachintamani Rasa
4. Brihat Vatachintamani Rasa
5. Gagana Parpati
6. Sutikabharana Rasa
7. Vasanta kusumakara Rasa
8. Yogenda Rasa
9. Mahayogaraja Guggulu
10. Mahalakshmi vilasa Rasa

Research Updates

1. Nandurkar Vishal Marotrao, **Pharmaceutical and Analytical study of Abhraka bhasma**, AYUSHDHARA; Nov.-Dec. 2020; Vol 7; Issue 6, 2958-2963

   The standardization of the manufacturing process of Bhasma play the crucial role in determining its therapeutic effectiveness which has to be optimized and standardized to improve the potency, reducing the toxic elements which will crucially enhance the usage of it as and medicinal agent against the broad spectrum of diseases. Analytical study of Abhraka Bhasma revealed the uniformity of the procedures in the three samples of Abhrakabhasma, as evidenced by the observations of the analytical values of the three samples were not much variations found.

2. Divya S. Kulala et al, **Understanding the effects of Abhraka Bhasma on genotoxicity and its DNA repair potential in mouse model,** Journal of Ayurveda and Integrative Medicine, Volume 14, Issue 2, March-April 2023, 100598

The *Abhraka Bhasma* preparation employed nearly 72 herbs and 1000 *puta* is considered to enables bioavailability. This contains multiple bioactive components including many elements such as iron, magnesium, calcium, zinc etc. The net effects of the *Bhasma* on various intricate pathways including anti-oxidant, potentiation of DNA repair and hematinic properties may be attributed to the synergistic activities of these bioactive components.

3. Y.L. Tamhankar et al, **Effect of Puta on in vitro anticancer activity of Shataputi Abhraka Bhasma on lung, leukemia and prostate cancer cell lines**, Journal of Ayurveda and Integrative Medicine 11 (2020) 118-123

   The study signifies the importance of various pharmaceutical processes of Rasashastra like Puta and the effect they have on the efficacy of the drug. It validates the Siddhanta that the activity of bhasma increases with increase in Putas. Thus, the number of Putas is directly proportional to the efficacy of the drug and inversely proportional to the particle size and the dosage required. Hence, it may be concluded that Shataputi Abhraka Bhasma, highly regarded as a Rasayana showed positive in vitro anticancer activity on prostate cancer cell lines

4. Rambhadur P. Subedi et al, **Study of General Properties of Abhraka Bhasma: A Nanomedicine,** Int. J. Pharm. Sci. Rev. Res., 44(2), May-June 2017, No. 47, 238-242

   The study has established the probable role of iron based constituents in efficacy of abhraka bhasma through the chemical modifications in the compartments of GI tract. The abhraka bhasma, in turn, influences the micro flora to ensure a smooth functioning of the compartments of GI tract. This in turn improves various physiological and behavioral responses in the organism.

5. Veeranna Haveri, **"Pharmaceutico-Analytical and Neuro-protective activity of Abhraka bhasma- An Experimental study" "**- PG dissertation, Rajiv Gandhi University of Health Sciences (India)

   XRD of ABL shows that it is the compound of Ferric oxide and Aluminum oxide in Trigonal crystal system and Silicon dioxide in Tetragonal form. SEM-EDX study shows the elements present in ABL are 0-33.66%, Na-0,88%, Mg- 2.28%, Al-4.50%, Si-10.84%, K-7.69%, Ca-2.21%, Ti- 1.50%, Fe-36.44%.

   FTIR Analysis shows AB contains Organic Compounds with functional groups like Primary and secondary Amines, Esters, Carboxylic acids, Alcohol, Aromatics, Alkenes, Bromide, and Iodidewhich affirms the entity of herbal compounds used for the Shodhana and marana.

   In Experimental study, it is observed that the trial drug ABL is having a definite demonstrable Neuro-protective action on Albino rats by BCCAO method. Higher dose did not show enhanced protection. However, the observed effect can be

considered to indicate moderate Neuro-protection in the test formulation. The presence of anti-oxidant effect and attenuation of increased lipid peroxidation and anti-inflammatory activity may contribute to the observed neuro-protection

Makshika (Chalco-Pyrite)

Makshika is categorised under the Maharasa as well as among Upadhatu varga. It belongs to Pyrite group of minerals. Among the different types of makshika, Swarna makshika is considered to be the superior drug. According to Rasa tarangini, its quality resembles that of swarna to some extent.

Synonyms

सुवर्णमाक्षिकं स्वर्णमाक्षिकं हेममाक्षिकम्।
माक्षीकं माक्षिकञ्चैव ताप्यञ्च धातुमाक्षिकम्।।
माक्षीकधातुञ्च तथा तापीजञ्चापि तन्मतम्। (R.T.21/1-2)

Suvarnamakshika	Swarnamakshika	Hemamakshika	Maksheeka	Makshika
Tapya	Dhatu Makshika	Makshika Dhatu	Tapija	Madhava Makshika
Avartha	Pakshi	Bruhadvarna	Garuda	Tapi Samudbava
Madhu Makshika	Madhu Dhatu	Peetaka	Peetam	Peeta Makshika
Apeeta	Hemadyuti	Tapyaka	Tapta	

Rajatamakshika

रौप्यमाक्षिकमाख्यातं तारजं तारमाक्षिकम् । विमलं श्वेतमाक्षीकं तथा रजतमाक्षिकम्।।
ईषद्रौप्यस्य साहित्याद् वा रौप्यगुणसाम्यतः । (R.T.21/55-56)

Roupya Makshika	Tarajam	Tara makshika
Rajata Makshika	Shweta Makshika	Vimala

Vernacular Names:

Sanskrit - Swarnamakshika
English - Chalcopyrite/copper pyrite
Hindi - Sonamakhi
Kannada - Swarnamakshika/dhatumakshika

Minerological Identification

Chemical composition	$CuFeS_2$. Small amounts of Ag, Au, Zn and other elements are commonly present
Colour	Brass yellow, furnishes to iridescent blues, green, yellow and purple.
Luster	Metallic

Crystal habit	Crystal are usually pseudo tetrahedral, displaying disphenoidal faces.
Cleavage	Poor in one direction
Specific Gravity	4.2
Diaphaneity	Opaque
Hardness (Moh's Scale)	3.5-4
Fracture	Conchoidal, uneven and brittle.
Streak	Greenish black

Sources and Occurrence

In our classics, Makshika was said to be found in Sumeru mountains across the banks of river Tapi and also in the regions of Yavana, Kirata, Kanya kubja and Cheena desha.

Chalcopyrite, the most important Copper mineral, is wide spread and commonly available in America, Russia, China, Nepal, Spain, Italy, Norway, Burma and Portugal. In India, it is found in Bihar, Rajasthan, Sikkim, Madhya Pradesh, Tamilnadu and Karnataka.

Types

माक्षिको द्विविधो हेममाक्षिकस्तारमाक्षिकः। (R.R.S.2/81)

According to Rasa Ratna Samuchchaya, Makshika is of 2 types:

1. Hema Makshika
2. Tara Makshika

Based on the Appearance and Colour, Makshika is of 3 types:

1. Swarna Makshika (Golden appearance).
2. Rajata Makshika (Silver appearance).
3. Kansya Makshika (Bronze appearance).

According to Ayurveda Prakasha, 2 types based on place of availability:

1. Kanyakubjodhbhava Swarnamakshika.
2. Tapati teeraja Swarnamakshika.

According to Anandakanda, 3 types based on its Shape:

1. Kadamba
2. Karavellakhya
3. Tanduleeyaka

Grahya Lakshana

स्निग्धं गुरु श्यामलकान्ति किञ्चित् कषे सुवर्णद्युतिसुप्रकाशम्।
कोणोज्झितं स्वर्णसमानवर्णं सुवर्णमाक्षीकमिह प्रशस्तम्।। (R.T.2¼)

Swarna Makshika having the following qualities is said to be acceptable one:

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1. Snigdham- Soft/unctuous.
2. Guru - Heavy.
3. Shaymala kanti- Bluish & blackish lustre.
4. Kinchit kashe suvarnadyuti- Golden colour shine on rubbing.
5. Kononjitha/Nishkona- Without angle.
6. Suvarnasadrusha/Bhangesuvarnasamkasha- Similar to the colour of gold, better appreciated at broken edges.
7. Panchavarna- Exhibits 5 colours of gold.
8. Krishnacchavi bahi- Externally blackish.
9. Bruhad varna- Rich colour.
10. Gruste kare kalimam- Appearance of blackish colour on rubbing over hand.

स्निग्धं सकोणं गुरु च वर्तुलं रजतोज्ज्वलम्। रौप्यवच्चाकचिक्याढ्यं जात्यं तद्रौप्यमाक्षिकम्।। (R.T.21/57)

Rajata Makshika having the following qualities is said to be acceptable one:

1. Snigdham - Soft/unctuous.
2. Sakona - With angles.
3. Guru - Heavy.
4. Vartula - Circular.
5. Rajatojjwala - Similar to the colour and complexion of Silver.
6. Roupyavachchakachikyadya - Appears like silver.

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Agrahya Lakshana

खरं परं वै गुरुताविहीनं प्रवृत्तकोणं खरलोहकाभम्। प्रकीर्तितं तत्परिहेयमेव सुवर्णमाक्षिकमिहामयज्ञैः।। (R.T.21/5)

Swarna Makshika having the following qualities has to be rejected.

1. Khara - Rough.
2. Gurathavihinam - Not heavy.
3. Pravrutta konam - With angles.
4. Kharalohaabhakam - That which resembles the metals which is rough.

समलं लघु रूक्षञ्च कषेऽतिमलिनच्छवि। अवर्तुलं विवर्णञ्च हेयं स्यद्रौप्यमाक्षिकम्।। (R.T.21/58)

Rajata Makshika having the following qualities has to be rejected:

1. Samala - With impurities.
2. Laghu - Light.
3. Rooksha - Dry.
4. Kashe ati malinachchavi - Appears to be more dirt on rubbing.

5. Avartula - Not circular.
6. Vivarna - Colour other than the silver colour.

Ashuddha Makshikajanya Dosha

अशोधितं वामृतमप्यशुद्धं निषेवितं माक्षिकमक्षिबाधाम्।
मन्दानलं कुष्ठहलीमकादीन् कोष्ठानिलं वै जनयेन्नितान्तम्।। (R.T. 21/6)

Ingestion of impure or improperly purified Swarna Makshika will causes:

1. Mandanala (Reduced digestion).
2. Kusta (Skin diseases).
3. Halimaka (Jaundice complicated with fever).
4. Kostanilaprakopa (Aggravated vata in GI tract).

अशुद्धं रौप्यमाक्षीकं स्वर्णमाक्षिकवद्भृशम्। जनयत्याशु मन्दाग्निं तथा कुष्ठादिकान् गदान्।। (R.T. 21/59)

Ingestion of impure or improperly purified Rajata Makshika will causes the illeffects same as Swarna Makshika. It leads to diseases like:

1. Agnimandya (Impaired digestion).
2. Kushta (Skin diseases) and others.

Therefore, it is mandatory to subject the Makshika for proper Shodhana before taking it into further pharmaceutical processing.

Shodhana

I[st] Method

एरण्डतैललुङ्काम्बुसिद्धं शुद्धयति माक्षिकम्। सिद्धं वा कदलीकन्दतोयेन घटिकाद्वयम्।। (R.R.S. 2/78)

Ashuddha Makshika powdered into coarse form and boiled for 2 hours in Eranda taila and Matulunga rasa to make the Makshika shuddha. Makshika will also get purify by boiling it in Kadali kanda rasa for 2 hours.

II[nd] Method

तप्तं क्षिप्तं वराक्वाथे शुद्धिमायाति माक्षिकम्। (R.R.S. 2/78)

If Ashuddha Makshika is heated well and dipped in Triphala kwatha for several times, Makshika will become shuddha

S.No.	Drugs used	Method of Shodhana	Reference
1	Eranda taila + Matulunga Rasa	Boiling/Swedana in Dolayantra for 2 hours	R.R.S.2/83
2	Kadalikanda toya	Boiling/Swedana in Dolayantra for 2 hours	R.R.S.2/83 R.T.21/18
3	Triphala Kwatha	Nirvapa	R.R.S.2/83

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4	Nimbu Rasa	Nirvapa for 21 times	R.T.21/15-16
5	Nimbu Rasa	Heating intensively for 2 or 3 days	R.T.21/7-11
6	Only Swarnamakshika	Bharjana	A.P.4/13
7	Taila, Takra, Gomutra, Aranaala,	Nirvapa	R .J N1/70
8	Kulattha, Triphala kwatha, Mutra, Takra, Kulattha kwatha	Bhavana	R.P.S.5/124

Rajata Makshika Shodhana

मेषश्रृङ्गीरसेनापि दोलायन्त्रे विधानतः। पाचितं रौप्यमाक्षीकं शुद्धिमायात्यानुत्तमाम्।। (R.T.21/66)

Shodhana of Roupya Makshika is done by boiling it in Dola yantra in the liquid media of Meshashrngi Rasa.

Swarna Makshika Marana

I[st] Method

मातुलुङ्गाम्बुगन्धाभ्यां पिष्टं मूषोदरे स्थितम्। पञ्चक्रोडपुटैर्दग्धं म्रियते माक्षिकं खलु।। (R.R.S.2/79)

Equal quantity of Shuddha Swarna makshika and Shuddha Gandaka are mixed together and triturated with Matulunga rasa. Later, the mixture is dried, enclosed in Musha or Sharava samputa and subjected for puta (Gajaputa or Varaha puta). The whole process is repeated for 5 times to get the Swarna Makshika bhasma.

II[nd] Method

एरण्डस्नेहगव्याजैर्मातुलुङ्गरसेन वा। खर्परस्थं दृढं पक्वं जायते धातुसंनिभम्।। (R.R.S.2/80)

Shuddha Swarna makshika is triturated with Eranda taila or Goghrta or Matulunga swarasa and dried. This dried powder taken over the kharpara and subjected to intense heating. This will yield the Swarnamakshika bhasma which resembles the Swarna gairika.

S.No	Drugs used	No. and Type of Puta	Reference
1	Gandhaka ; Matulunga rasa for bhavana	5 putas (Gaja puta or Varaha puta)	R.R.S.2/84
2	Eranda taila or Goghrta or Matulunga Swarasa bhavana	Paka over Kharpara	R.R.S.2/85
3	Nimbu rasa for bhavana	10 putas (Gaja puta or Varaha puta)	R.T.21/19-20
4	Gandhaka ; Nimbu rasa for bhavana	5 putas (Gaja puta or Varaha puta)	R.T.21/21-22
5	Gandhaka+Urubuka	1 Gaja puta	A.P.4/14-15
6	Kumari rasa	27 Kukkuta puta	R.J.Ni. 1/80

Rajata Makshika Marana

स्वर्णमाक्षिकवत्कार्यं रौप्यमाक्षिकमारणम्। प्रयोगाल्पतया चास्य व्याख्यानं नाधिकं कृतम्।। (R.T.21/68)

The marana of Rajata makshika is similar to that of the marana process told for Swarna makshika. As the therapeutic applicability is less for Rajata makshika, no much explanation of that process is given.

Satwa Patana

Swarna Makshika

पादांशटङ्कणोपेतं मर्दितं हेममाक्षिकम्। ध्मातं मूषागतं सत्वं मुञ्चत्याशु सुनिश्चितम्।। (R.T.21/46)

One part of Shuddha Swarna makshika is triturated with one fourth part of Tankana in khalwa yantra to form an homogenous mixture. Then the mixture is confined to Musha and heated in intense fire by which the satwa get extracted out of Swarna Makshika.

Rajata Makshika

पादांशटङ्कणोपेतो लकुचद्रावमर्दितः। विमलः सुचिरं ध्मातः सत्वं सीसोपमं त्यजेत्।। (R.T.21/70)

One part of Shuddha Rajata Makshika is mixed thoroughly with one fourth part of Tankana and trituration done by adding Lakucha rasa. After drying of the mixture, it is enclosed in the Musha and subjected for intense heating by which the satwa resembling the Lead get extracted out from Rajata makshika.

Probable Physico-chemical changes during above processing

Several methods of shodhana can be employed for the purification of Makshika, but commonly used method is heating intensively with Nimbu swarasa. Makshika on heating eliminates sulphur while iron and copper part get converted into their oxide forms. Nimbu Swarasa, by its acidic nature aids in mass breaking and disintegration. So, after Shodhana, formation of some chemical compounds might take place.

From the EDAX study, it was observed that the amount of sulphur gradually decreases and amount of oxygen increases from raw material to Bhasma and the Bhasma contains least amount of sulphur and maximum amount of oxygen. This happens due to sublimation of sulphur from raw material while heating and substitution of oxygen during the process. Thus, the Bhasma may be more suitable to the body as it contains more oxygen and least sulphur.

Bhasmeekarana is achieved by the process of Marana, which is an endothermic reaction and energy supplied in the form of heat. This can be compared to Annealing, the process of heating metal or mineral which are in metastable or distorted structure state. Temperature will remove the instability or distortion and then cooling at a slow rate will make it more stable. Its purposes are inducing a completely stable refining and homogenizing the structure, reducing hardness, producing desired micro structure,

removing residual stresses, improving mechanical, physical and electromagnetic properties. So the changes after marana can be inferred as due to the process of Annealing.

Properties and Therapeutic Uses

मधुरः काञ्चनाभासः साम्लो रजतसन्निभः। किंचित्कषायमधुरः शीतः पाके कटुर्लघुः।
तत्सेवनाज्जराव्याधिविषैर्न परिभूयते।। (R.R.S. 2/78-79)

सुवर्णमाक्षिकं वृष्यं मधुरं तु रसायनम्। तिक्तं स्वर्यञ्च चक्षुष्यं त्रिदोषघ्नं परं मतम्।।
क्षयमर्शांसि मेहानि विविधाः बस्तिवेदना। पाण्डुश्वयथुकुष्ठानि विषदोषादिकान् हरेत्।
जीर्णज्वरमपस्मार मन्दानलमरोचकम्। अनिद्रां नाशयत्याशु योगवाहि परं मतम्।। (R.T.21/26-28)

Rasa	Madhura, Tikta, Kashaya
Guna	Laghu, Rooksha
Veerya	Sheeta
Vipaka	Katu
Doshaghnata	Tridoshaghna specially Kaphapittahara
Karma	Vrshya, Rasayana, Swarya, Chakshusya, Yogavahi, Savarogahara, Rasendra prana, Dwandwa melapaka
Prayoga	Kshaya, Arshas, Meha, Bastivedana, Pandu, Shvayathu, Kushta, Vishadosha, Jeerna jwara, Apsmara, Agnimandya, Arochaka, Anidra

स्वर्णमाक्षिाकवज्ज्ञेया विमलस्य गुणा बुधैः। मात्रां चामयिकं योगं तथैव परिलक्षयेत्।। (R.T.21/69)

The qualities of the Rajata makshika is considered to be the same as that of Swarna makshika and hence the Dose, Amayika prayoga should also the same of that of Swarna makshika.

Dose

गुञ्जार्द्धतः समारभ्य बलकालाद्यपेक्षया। गुञ्जाद्वितयपर्यन्तं माक्षिकं योजयेद्भिषक्।। (R.T.21/29)

With due consideration of the Bala, Kala and other factors, Makshika can be administered starting from the dose of ½ gunja upto the dose of 2 gunja i.e., 62-250 mg.

Anupana

अनुपान वरा व्योष वेल्लं साज्यं हि माक्षिके। (A.P.4/10)

Makshika is administered along with the Triphala, Trikatu, Vidanga, Ghrta or Madhu as anupana.

Management of Ashuddha, Apakwa and Avidhee sevanajanya dosha of Makshika

कुलत्थस्य कषायेण माक्षीकविकृतिं जयेत्। दाडिमस्य त्वचो वाऽपि प्रोक्ता विकृतिनाशिनी।। (B.R.R.S)

To cure the ill effects caused by the ingestion of impure or improperly processed

Makshika, it is advised to use kulattha kwatha till the symptoms get pacifies. Also the intake of Dadima twak kwatha cures the ill effects of Ashuddha makshika janya dosha.

Important Formulations

1.	Panchamruta Parpati
2.	Chandraprabha Vati
3.	Grahani kapata Rasa
4.	Jayamangala Rasa

5.	Ratnagarbha Potali
6.	Sarveshvara Parpati
7.	Chaturmukha Rasa

Research Updates

1. Sudhaldev Mohaptra et al, **Physicochemical characterization of Ayurvedic bhasma (Swarna makshika bhasma): An approach to standardization**, International Journal of Ayurveda Research, April-June 2010, Vol 1, Issue 2

   Swarna makshika contains iron (Fe), Copper (Cu) and sulfur. The manufacturing process plays a specific role to convert the $CuFeS_2$ in the raw material mixture of Fe_2O_3, FeS_2, CuS and SiO_2, in the final product. These could be important chemical markers for SM bhasma prepared using this particular method. As a result of different stages of processing techniques like shodhana (which involves roasting, with addition of herbal juices and continuous stirring) and marana, the particle size reduces significantly, which may facilitate absorption and assimilation of the drug into the body system. The particle size in the final bhasma was 1-2 μ, which could be specified as the criterion for the final product conforming to all the traditional parameters under bhasma pariksha.

2. Dr. Shrikanth AS et al,**Anti-Oxidant effects of Swarnamakshika Bhasma : A Experimental Study.** *JAIMS*, 5(04), 92-101.

   Shodhana by Bharjana process in Eranda Taila, Bhavana with Jambhira Swarasa & Marana by 12 Varaha Puta were sufficient to obtain Swarna Makshika Bhasma which passed all the Bhasma Parikshas. Reduction in the MDA level, increase in CAT and GSH represents good antioxidant activity of Swarna Makshika Bhasma at the dose of 200 mg/kg. To inhibit lipid peroxidation, Swarna Makshika Bhasma 200 mg/kg was found to be statistically significant when compared to CCl4 group. In LPO, CAT, SOD & GSH also, Swarna Makshika Bhasma 200 mg/kg showed statistically significant results when compared to CCl4 group.

3. Mohapatra S et al, **Analytical study of raw Swarna Makshika (Chalcopyrite) and its Bhasma through TEM and EDAX**. Ayu. 2013 Apr;34(2):204-8.

   This study concludes that the ancient pharmaceutical processes are very effective in converting the macro elements into therapeutically effective medicines of micro form. The size of the raw material (5-10 microns) was reduced to 50-200 nm in

the Bhasma. It implies that, the classical procedures reduce the particle size to a considerable level. Increase of Fe and Cu along with other trace elements and decrease of sulphur was observed in the Bhasma in EDAX study.

4. Singh et al. **AN EXPERIMENTAL STUDY OF SWARNA MAKSHIKA BHASMA AS ANTI DIABETIC MEDICINE**, UJAHM 2014, 02 (06): Page 1-6

Experiment was carried out in 7 groups and for total duration of 27 days. The effect of graded dose of Swarna Makshika bhasma (SMB) solution (5.85 mg/kg 11.25 mg/kg and 22.5 mg/kg), standard drug glibenclamide and a combination of standard drug and medium dose of SMB was observed on Blood sugar level, total cholesterol and triglyceride level. SMB showed marked decrease in blood sugar level from 7th day onwards of treatment. The results with experimental drug SMB was comparable with standard drug glibenclamide.

Shilajatu (Asphaltum Punjabianum)

Shilajatu is the drug belonging to Maharasa varga. The word shilajatu includes two terms; Shila which means rock and jatu is the kind of resin which exudates out. So Shilajatu is mentioned as a resin like structure exudating out of rocks in the Himalayan area. There are different opinions among the scholars regarding the genesis of Shilajatu.

CHAPTER EIGHT

Synonyms

शिलाजतु च शैलेयं शिलाजं शैलधातुजम्। शिलामयः शिलस्वेदः शिलानिर्यास इत्यपि।।
अश्मजं त्वश्मजतुकं गिरिजं त्वद्रिजं तथा। अश्मोत्थमश्मलाक्षा च गैरेयञ्च मतन्तु तत्।। (R.T.22/60-61)

Shilajatu	Shaileya	Shilajam	Shailadhatuja	Shilamaya
Shilasweda	Shilaniryasa	Asmajam	Ashmajatuka	Girijam
Adrijam	Ashmottha	Ashmalaksha	Gaireya	Shilaja
Jatu	Adreyam	Ushnaja	Jatvasmaka	Shilabhyam

Vernacular Names

Sanskrit - Shilajatu
English - Blach Bitumen or Mineral pitch
Hindi - Shilajatu, Shilaajeeth
Kannada - Shilajatu

Minerological Identification

Mineral pitch/Asphalt/Black bitumen

Bitumen is a sticky, black, and highly viscous liquid or semi-solid form of petroleum. It is amorphous and is mixture of different hydrocarbons, part of which are oxygenated.

Colour	Brownish black (Laksha Varna)
Odour	Bituminous (Gomutra Gandhi)
Specific gravity	1 - 1.8
Melting point	90 - 100°C
Ductility at 27°C	75
On fire	Burnt with bright flame with out smoke (Nirdhooma).

Sources and Occurrence

According to the Acharyas of Samhita period, shilajatu has its origin as a mineral source.

ग्रीष्मेऽर्कतप्ताः गिरयो जतुतुल्यं वमन्ति यत्। हेमादिषड्धातुरसं प्रोच्यते तच्छिलाजतु।। (A.H.U. 39/13)

In Astangahrudaya, it has been told that during summer season, when the stones in the mountain become excessively hot because of sun rays, wax like exudates oozes out of them. This exudates contains the essence of six types of metals like gold, silver etc and it is called shilajatu.

ग्रीष्मे तीव्रार्कतप्तेभ्यः पादेभ्यो हिमभूभृतः। स्वर्णरुप्यार्कगर्भेभ्यः शिलाधातुर्विनिः सरेत्।। (R.R.S 2/110)

Due to heat of intense sun rays in summer shilajatu oozes out from the rocks consisting of metals like gold, silver, copper etc., which are present at the base of Himalaya mountain.

Shilajatu is also observed oozing out of the lime stones in the mountains near Sarayu and Ramaganga in Kumayan district of Uttar Pradesh. Apart from these regions, it is also available in Nepal, Kashmir and Punjab.

CHAPTER EIGHT

TYPES

Based on the Source

Acharya Charaka has told 4 types of Shilajatu

1. Hemagarbha
2. Taragarbha
3. Tamragarbha
4. Ayogarbha

The same types of shilajatu also told by R.R.S.

According to Acharaya Sushrutha and Vagbhata, it is of 6 types

1. Hemagarbha
2. Taragarbha
3. Tamragarbha
4. Ayogarbha
5. Nagagarbha
6. Vangagarbha

Based on the Odour

शिलाजातुर्द्विधा प्रोक्तो गोमूत्राद्यो रसायनः। कर्पूरपूर्वकश्चान्यस्तत्राऽऽद्यो द्विविधः पुनः।।
ससत्त्वश्चैव निःसत्त्वस्तयोः पूर्वो गुणाधिकः। (R.R.S.2/101)

Shilajatu is of 2 types:- 1. Gomutra shilajatu 2. Karpoora shilajatu

Karpoora shilajatu is further classified into- i). Sasatwa ii). Nissatwa

Grahya Lakshana

Characteristics of Shilajatu

गोमूत्रगन्धि कृष्णं गुग्गुल्वाभं विशर्करं मृत्स्नम्। स्निग्धमनम्लकषायं मृदु गुरु च शिलाजतु श्रेष्ठम्।।

(A.H.Ultara tantra 39/133)

Excellent type of Shilajatu has the following characteristic features.

1. Gomutra Gandhi- Smell like cows urine.
2. Krishna - Black in colour.
3. Guggulvabham - Looks like guggulu (gum resin of Commiphora mukul).
4. Visharkara Mritsnam - Should look like claywhich is free from sand particle.
5. Snigdha - Smooth and soft.
6. Anamla kashaya - Not sour but astringent in taste.
7. Mrudu - Soft.
8. Guru - Heavy.

Tests for Shilajatu

CHAPTER EIGHT

Shilajatu having these characteristic features is excellent in quantity.

वह्नौ क्षिप्तं भवेद्यत्तल्लिङ्गाकारमधुमकम्। सलिलेऽप्य विलीनं च तच्छुद्धं हि शिलाजतु।। (R.R.S.2/114)

If Shilajatu is placed on fire, it burns without smoke and forms a shape of a linga.

If it is placed in the water, it dose not dissolve it moves to the bottom like a sinking thread, such kind of shilajatu is said to be pure (best).

सलिले या विनिक्षिप्ता तन्तुप्रसवकारिणी। आस्वादे कटुतिक्ता च शिलालाक्षा तु सामला।। (R.T.22/83)

When Shilajatu is placed in water, it should go down to the bottom in the pattern of sinking thread.

It should possess the taste of Katu and Tikta.

Ashuddha Shilajatu janya Dosha

अशुद्धं दाहमूर्च्छाभ्रमपित्तावशोषकृत्। शिलाजतु विधते हि मान्द्यमग्नेश्च विड्ग्रहम्।। (A.P. 4/105)

Ingestion of impure or improperly processed Shilajatu will produce:

1. Daha (Burning sensation)
2. Murccha (Loss of consciousness)
3. Bhrama (Giddiness)
4. Rakta pitta (Bleeding disorder)
5. Shosha (Emaciation)
6. Agnimandya (Loss of appetite)
7. Vidgraha (Constipation)

Shodhana

I Method

क्षाराम्लगोजलैर्धौतं शङ्खद्रत्येव शिलाजतु। (R.R.S.2/116)

Shilajatu will get purified if it is washed with Kshara jala, any Amla drava and Gomutra one after the other in each liquids. After adding any of the above mentioned dravas to the Shilajatu, it has to be stirred well so that Shilajatu will get dissolved. Later, it has to filtered into large trays and kept for drying to get Shuddha Shilajatu.

II Method

क्षाराम्लगुग्गुलोपेतैः स्वेदनीयन्त्रमध्यगैः। स्वेदितां घटिकामानाच्छिलाधतु विशुद्धयति।। (R.R.S.2/118)

Shilajatu should be taken along with equal quantity of Yava kshara and guggulu, mixed well to make uniform mixture. This mixture is placed over the cloth tied at the mouth of the Swedani yantra which contains Kanji inside it. After covering the mixture with the sharava over it, the Swedani yantra is kept for boiling for 1 hour. This will purify the Shilajatu.

Suryataapi Shilajatu: During Shilajatu shodhana, after filtering the solution of Shilajatu with the different liquids into the large trays, if it is dried in sun to get the thicker consistency, then the Shodita Shilajatu is called as Suryataapi Shilajatu.

Agnitaapi Shilajatu: During Shilajatu shodhana, after filtering the solution of Shilajatu with the different liquids into the large trays, if it is heated over the low flame to get the thicker consistency, then the Shodita Shilajatu is called as Agnitaapi Shilajatu.

Among the above two, Suryataapi Shilajatu is considered to be better than Agnitaapi Shilajatu as the more Volatile principles having therapeutic property will be retained in Suryataapi Shilajatu.

S.No.	Drugs used	Method of Shodhana	Reference
1	Kshara jala, Amla drava and Gomutra	Dhavana	R.R.S. 2/116
2	Milk or Triphala kwatha or Bhringaraja swarasa	Nikshepa (Soaking)	R.R.S. 2/117
3	Yava kshara, kanji and guggulu	Swedana in Swedani yantra for 1 hour	R.R.S. 2/118

Marana

शिलया गन्धतालाभ्यां मातुलुङ्गरसेन च। पुटितो हि शिलाधातुम्रियतेऽग्निरिण्डकैः।। (R.R.S.2/119)

Shuddha Shilajatu is taken along with equal quantity of Shuddha Manashila, Shuddha Gandhaka and Shuddha Haratala in Khalva yantra grounded well and triturated by adding Matulunga Rasa. Chakrikas are prepared, dried and enclosed in

sharava samputa. Later, it is subjected to puta using 8 Vanopalas to yield the bhasma of Shilajatu.

S.No	Drugs used	No. and Type of Puta	Reference
1	Shuddha Manashila, Gandhaka and Haratala; Matulunga rasa for bhavana	Puta with 8 Vanopalas.	R.R.S.2/119

Satwapatana

पिष्ट्वा द्रावणवर्गेण साम्लेन गिरिसंभवम्।
क्षिप्त्वा मूषोदरे रूद्ध्वा गाढैर्ध्मातं हि कोकिलैः।।
सत्त्वं मुञ्चेच्छिलाधातु स्तत्क्षणल्लोहसन्निभम्।। (R.R.S.2/122)

Shuddha Shilajatu is mixed with the Dravaka varga dravyas and triturated with Amla dravas. After drying of the mixture, it is taken in Musha, sealed and heated in intensive fire of coal. This will yield the Satwa of Shilajatu which resembles the Iron.

Though the Marana and Satwapatana process of Shilajatu has been to told in our classics, these methods are not employed in present days. Only the Shuddha Shilajatu is used for therapeutic purposes and for various formulations.

Probable Physico-chemical changes during above processing

The shodhana process of Shilajatu helps in removal of dust and spurious material by washing the drug with water or other liquids. Kshara jala used for dhavana or swedana removes the external impurities and also softens the drug. Triphala kwatha and Bhrungaraja Swarasa are also used as Shodhana Dravya. These are considered to be a Rasayana in Ayurveda and works wonderfully on Tridosha and maintains their balance which might be the probable reason for using them for Shodhana since it augments the Rasayana effect of Shilatu.

Properties and Therapeutic Uses

शिलाजतु मतं तिक्तं विपाके कटुकं तथा। मूत्रलञ्च विशेषेण योगवाहि रसायनम्।। (R.T.22/84)

Rasa	Tikta
Guna	Snigdha
Veerya	Ushna
Doshaghnata	Kapha Vatahara
Karma	Rasayana, Yogavahi, Mutrala, Deha daardyakara, Medhasmritikara, Balya, Jara vyadhi prashamaka
Prayoga	Shvayathu, Pandu, Kshaya, Swasa, Pliha vrddhi, Jwara, Agni mandya, Apasmara, Unmada, Udara, Arshas, Mutrakrcchra, Sthoulya, Urakshata, Hrdroga, Vamana roga, Gulma, Vatarakta

Shilajatu Types And Their Properties: (R.R.S. 2/111-113, R.T. 22/65-68)

Type	Colour	Rasa	Guna	Vipaka	Doshaghnata
Swarna garbha Shilajatu	Red like Japakusuma	Madhura, Tikta, Katu	Sheeta	Katu	Vata pitta hara
Rajata garbha Shilajatu	Pandu varna (Pale white)	Tikta	Sheeta	Madhura	Kapha pitta hara
Tamra garbha Shilajatu	Neela varna (Blue)	Tikta	Teekshn Guru, Ushna	Katu	Kaphahara
Loha garbha Shilajatu	Krishna Varna (Black)	Tikta, Lavana, Kashaya	Sheeta, Guru, Snigdha	Katu	Tridoshahara

Dose

द्विगुञ्जातः समारभ्य वसुगुञ्जमितं परम्। शिलामयं प्रयुञ्जीत बलकालाद्यपेक्षया।। (R.T.22/87)

Depending upon the bala, kala and other aspects, Shilajatu can be administered from 2 Ratti to 8 Ratti (250 mg - 1 gm).

According to Charaka,

Pravara matra - 4 tola (48 gms)

Madhyama matra - 2 tola (24 gms)

Avara matra - 1 tola (12 gms)

Anupana

पयांसि तक्राणि रसाः सयूषास्तोयं समूत्रा विविधाः कषायाः।
आलोडनार्थं गिरिजस्य शस्तास्ते ते प्रयोज्याः प्रसमीक्ष्य कार्यम्।। (C.S. Chikitsa stana 1/3/27)

Milk, Takra, Mamsa Rasa, Yusha, Jala, Gomutra or different suitable Kashayas can be used as Anupana during Shilajatu administration.

Pathya- Apathya

Pathya- Dugda, Takra, Mudga, Rain and well water.

Apathya- Vyayama, Atapasevana, Vayusevana, Kulattha, Kakamachi, Kapotapakshi, Vidahi and Guru ahara.

Karpura Shilajatu

पाण्डुरं सिकताकारं कर्पूराद्यं शिलाजतु।
मूत्रकृच्छ्राश्मरीमेहकामलापाण्डुनाशनम्।। (R.R.S.2/123)

Karpura Shilajatu is yellowish white in colour and crystalline in nature with the appearance of sand. It cures Mootrakrcchra, Asmari, Prameha, Kamala and pandu roga.

Pandu Roga

एलातोयेन संभिन्नं सिद्धं शुद्धिमुपैति तत्। नैतस्य मारणं सत्त्वपातनं विहितं बुधैः।। (R.R.S.2/124)

Shodhana of Karpoora Shilajatu is done by the process of bhavana with the Ela jala. Marana and Satwapatana has been not told by the Acharyas for the Karpura Shilajatu

Potassium Nitrate

SORA (KNO_3) is used as Karpura shilajatu. It is yellowish in colour and sand sized. It is a chemical compound naturally occurring mineral source of nitrogen. KNO_3 constitutes a critical oxidizing component of black powder/gunpowder.

Chemical composition	KNO_3
Colour	White
Luster	Vitreous
Crystal habit	Orthorhombic
Cleavage	Very good
Specific Gravity	2-3
Diaphaneity	Transparent
Hardness (Moh's Scale)	1-2
Fracture	Brittle
Streak	White
pH	7-10

CHAPTER EIGHT

Important Formulations

1. Arogyavardhini Rasa
2. Kushtakutara Rasa
3. Chandraprabha Vati
4. Tapyadi Vati
5. Purnachandra Rasa
6. Shiva Gutika
7. Lankeshwara Rasa
8. Shilajatvadi Vati
9. Yogaraja Rasa
10. Sarvamehantaka Rasa

Research Updates

1. Singh R et al, Antioxidant Profile of Shilajatu (Asphaltum punjabinum): Impact of Drava/Media and Bhumi/Geography. Free Radicals and Antioxidants. 2021; 11(1):19-23

It has been found that Shilajatu samples processed in Triphala kwatha have shown better antioxidant profile than water processed samples. Moreover, sample procured from Amritsar showed much better antioxidant activity in comparison to Shilajatu sample procured from Nepal. Processing media and geography significantly modulate the effect and activities of Shilajatu. In nutshell, Shuddha Shilajatuis a

powerful antioxidant and processing media can be selected appertaining to nature of disease and purpose.

2. N.A. Trivedi et al, **Effect of shilajitu on blood glucose and lipid profile in alloxaninduced diabetic rats,** Indian J Pharmacol; Dec. 2004; 36(6); 373-376

In the diabetic rats, all the three doses of shilajitu produced a significant reduction in blood glucose levels and also produced beneficial effects on the lipid profile. The maximum effect was observed with the 100 mg/kg/day dose of shilajitu.

Combination of shilajitu (100 mg/kg) with glibenclamide (5 mg/kg/day) or metformin (0.5 gm/kg/day) significantly enhanced the glucose lowering ability and improvement in lipid profile than any of these drugs given alone. So Shilajitu is effective in controlling blood glucose levels and improves the lipid profile.

3. K. Jaiswal A, et al, **Effects of *shilajit* on memory, anxiety and brain monoamines in rats.** *Indian Journal of Pharmacology. 1992;24:12–17.*

Shilajit had significant nootropic and anxiolytic activity. The biochemical studies indicated that acute treatment with Shilajit had insignificant effects on rat brain monoamine and monoamine metabolite levels. However, following subacute (5days) treatment, there was decrease in 5-hydroxytryptamine and 5-hydroxyindole acetic acid concentrations and an increase in the levels of dopamine, homovanillic acid and 3.4-dihydroxyphenyl-acetic acid concentrations, with insignificant effects on noradrenaline and 3-methoxy-4- hydroxyphenylethylene glycol levels. The observed neurochemical effects induced by Shilajit, indicating a decrease in rat brain 5-hydroxytryptamine turnover, associated with an increase in dopaminergic activity, helps to explain the observed nootropic and anxiolytic effects of the drug.

4. Saleem, A. M. et al,**Chemical and Pharmacological evaluation of Karpura Shilajit bhasma, An Ayurvedic Diuretic Formulation.** African Journal of Traditional, Complementary and Alternative Medicines, 3(2), 27–36.

Gross behavioral studies and diuretic activity were evaluated in experimental animals. The LD50 was found to be 4.625 g/kg p.o. body weight in mice. Karpura shilajit bhasma produced mild reduction in motor coordination and mild sedation during the first 2 hours after administration at the doses of 500-5000 mg/kg p.o. in mice. The diuretic activity was found to be significant at minimum dose of 200 mg/kg p.o. in rats and dose dependant up to 1000 mg/kg p.o. Further more, natriuretic effect was found to be significant, while no significant change was observed on urinary potassium excretion. The present study justified the use of Karpura shilajit bhasma as a diuretic drug.

Gandhaka (Sulfur)

Gandhaka is included under uparasa group in all the Rasagranthas. Parada and Gandhaka finds maximum use in Rasashastra. Gandhaka is the principle material used for making the most important preparation like Rasalinga, Rasabandha etc. Gandhaka stands next to Parada in importance, it is also considered as an essential substance for Murchana and Marana. The Rasadravyas are classified as Sagandha and Nirgandha kalpas on the basis of presence and absence of Gandhaka.

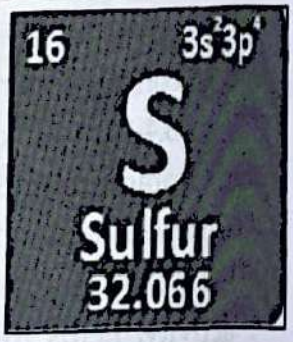
Synonyms

गन्धको गन्धपाषाणः गन्धी च रसगन्धकः। सुगन्धिको गन्धिकश्च गन्धः सौगन्धिकस्तथा।।
पूतिगन्धोऽतिगन्धश्च पामारिः कीटनाशनः। बलिर्बलिवसाख्यश्च कुष्ठारिः शरभूमिजः।।
शुल्बारिर्नवनीतश्च दैत्येन्द्रो गन्धमादनः। कीटघ्नः क्रुरगन्धश्च स एव परिकीर्तितः।। (R.T.8/1-3)

Gandhaka	Gandhapashana	Gandhi	Rasa Gandhaka	Sugandhika
Gandhika	Gandha	Saugandhika	Putigandha	Atigandha
Pamari	Keetanashana	Bali	Balivasa	Kushtari
Shoorabhumija	Shulbari	Navaneeta	Daityendra	Gandhamadana
Keetaghna	Kruragandha	Shuka puccha	Lelitaka	

Vernacular Names

Sanskrit - Gandhaka
English - Sulphur
Hindi - Gandhak
Kannada - Gandhaka



Minerological Identification

It is estimated as the Ninth most abundant element in the universe. It is an abundant multivalent non-metal. Sulfur, in its native form, is a yellow crystalline solid. It is an essential element for life and is found in two amino acids, cysteine and methionine.

Properties

Chemical Symbol	S
Colour	Yellow
Luster	Resinous to greasy. Powdered Sulfur is dull or earthy
Crystal habit	Orthorhombic
Cleavage	None
Specific Gravity	2.08
Diaphaneity	Transparent to translucent.

Hardness (Moh's Scale)	2.0
Fracture	Conchoidal
Streak	Yellow
Melting point	112.8°C
Boiling point	444.6°C
Auto-ignition temperature	248-266°C

Sources and Occurrence

Sulphur is distributed in nature both in free and combined form. In native form, it is found in Sicily, Italy, Spain, Texas, Japan. In combined form, found in Russia, Japan, Burma, Iceland, U.S.A., Chile, Philippines and other places. In combined form, it is available in the form of different compounds.

1. Copper pyrite (Swarna Makshika)
2. Copper sulphate (Sasyaka)
3. Zinc sulphate (Yashada)
4. Realgar (Manashila)
5. Iron pyrite (Vimala)
6. Ferrous sulphate (Kasisa)
7. Orpiment (Haratala)
8. Antimony sulphide (Srotanjana)

In India, Sulphur is available in Simhabhuma district, Rohitas district of Bihar, Rajasthan, Assam and Andhra pradesh. Traces of sulphur occur as H_2S in volcanic gases. Organic substance such as eggs, proteins, garlic, mustard, onion, hair and wool contains traces of Sulphur. It is an essential non-metal and is a minor constituent of fats, body fluids and skeletal muscles.

Types

स चापि त्रिविधो देवि! शुकचञ्चुनिभो वरः। मध्यमः पीतवर्णः स्याच्छुक्लवर्णोऽधमः स्मृतः।।
चतुर्था गन्धको ज्ञेयो वर्णैः श्वेतादिभिः खलु। श्वेतोऽत्र खटिका प्रोक्तो लेपने लोहमारणे।।
तथा चामलसारः स्याद्यो भवेत्पीतवर्णवान्। शुकपिच्छः स एव स्याच्छ्रेष्ठो रसरसायने।।
रक्तश्च शुकतुण्डाख्यो धातुवादविधौ वरः। दुर्लभः कृष्णवर्णश्च स जरमृत्युनाशनः।। (R.R.S.3/12-15)

According to Rasa ratna samucchaya, Gandhaka is of 3 types:

1. Shuka chunchanibham- Shreshta.
2. Peetavarna- Madhyama.
3. Shukla varna- Adhama.

Based on colour, Gandhaka is of 4 types:

1. Shweta (Khatika)- Used for lepana and Lohamarana.
2. Peeta (Amalasara/Shuka piccha)- Used for Rasa and Rasayana purpose.
3. Rakta (Shukatunda)- Used for Dhatuvada.
4. Krishna-Durlabha- It is Jara mrutyu nashaka.

Grahya Lakshana

शुकपिच्छसमच्छायो नवनीतसमप्रभः। मसृणः कठिणः स्निग्धः श्रेष्ठो गन्धक उच्यते।। (A.P. 2/20)

Genuine Gandhaka should have following characteristics:

1. Shuka piccha samacchaya- The colour resembles that of the tail (feather) of parrot (yellow with greenish tinge).
2. Navaneeta samaprabha- Soft and glistening appearance like butter.
3. Masruna- Smooth.
4. Katina- Hard.
5. Snigdha- Unctuous.

Ashuddha, Apakwa and Avidhee Sevanajanya Dosha

अशुद्धगन्धः कुरुते च कुष्ठं ताप भ्रमं पित्तरुजं तथैव।
रूपं सुखं वीर्यबलं निहन्ति तस्माद्विशुद्धो विनियोजनीयः।। (A.P.2/18)

Gandhaka should be purified before administering internally. Other wise it will produce the disease like.

1. Kushta
2. Tapa
3. Bhrama
4. Paithika Roga
5. Balakshaya
6. Veeryahani

CHAPTER EIGHT

Shodhana

I Method

पयःस्विष्टो घटीमात्रं वारिधौतो हि गन्धकः। गव्याज्यविद्रुतो वस्त्राद् गलितः शुद्धिमृच्छति। (R.R.S.3/20)

Gandhaka is taken in darvi smeared with cow's ghee and melted on mrudu agni. This liquefied Gandhaka is poured into another vessel which contains cow's milk through a cloth tied over the mouth of vessel and boiled for an hour in cow's milk. After that it is taken out and washed with hot water.

Note:- The above procedure s followed routinely for doing shodhana of Gandhaka. But in Rasa Ratna samuchchaya, it has mentioned to do the swedana using milk for an hour and then do the Dalana to the milk.

II. Method

स्थाल्यां दुग्धं विनिक्षिप्य मुखे वस्त्रं निबध्य च। गन्धकं तत्र निक्षिप्य चूर्णितं सिकताकृति।
छादयेतदुग्धेतपृथुदीर्घेण खर्परेणैव गन्धकम्। ज्वालयेत्खर्परस्योर्ध्ववनच्छाणैस्तथोपलैः।।
दुग्धेनिपत्तितो गन्धो गलितः परिशुध्यति।। (R.R.S.3/24-25)

Cow's milk is taken in a vessel of wide mouth and its mouth is tied with a cloth. Then, the coarse powder of Gandhaka is spread upon this cloth and is covered with a broad and big sharava. Cowdung cakes are spread upon the sharava and ignited. Gandhaka which is melted by the heat of the fire, trickles down through the cloth into

the milk inside the vessel and solidifies. This Bhoodara yantra method process will purify the Gandhaka and if this procedure repeated for hundred times, Gandhaka will become odourless.

III. Method

खल्वे सौगन्धिकं क्षिप्त्वा दृढं सम्पेषयेत्ततः। श्लक्ष्णचूर्णं ततो ज्ञात्वा चतुष्पलमितं बलिम्।।
यन्त्रे डमरुसंज्ञे च पचेद्यामचतुष्टयम्। ऊर्ध्वलग्नं बलिं पीतं यत्नतो ह्यवतारयेत्।।
एवं संशोधितो गन्धः शुद्धिमायात्यनुत्तमाम्। (R.T.8/23-25)

Gandhaka of about 4 palas (200 gms) is taken in Khalva yantra, pounded into coarse powder and confined in damaru yantra. This damaru yantra is subjected to heat for 4 yama (12 hours). Gandhaka inside the damaru yantra melts, vapourises and get condensed as a bright yellow droplets at the inner side of the base of the upper pot. This Gandhaka processed by this method is considered to be purified and best one which is devoid of physical and other kinds of impurities.

S.No.	Drugs used	Method of Shodhana	Reference
1	Goghruta and Godugdha	Dalana and Pachana	R.R.S.3/20
2	Goghruta and Godugdha	Dalana for 3 times	A.P. 2/21-24
3	Bhringaraja Swarasa	Dalana for 7 times	R.R.S.3/23
4	Godugdha	Bhudhara method	R.R.S.3/24-25
5	Only Gandhaka	Damaru yanta method	R.T.8/23-25

Probable Physico-chemical changes during above processing

Gandhaka is purified along with ghee and milk. In Dalana method described here, When powdered Gandhaka is melted in Ghee, Ghee absorbs toxic materials and helps in removal of fat soluble impurities. Later when melted Gandhaka is poured into milk, Water and colloidal soluble impurities will be removed by milk. By Vastragalana, filtering through a cloth, stones and other physical impurities are retained in the filtering cloth.

In Damaru Yantra Vidhi/Urdhwapatana of Gandhaka, the powdered form of Sulphur produced by sublimation will be devoid of physical and chemical impurities as Gandhaka is having low melting and it gets sublimated soon.

Properties and Therapeutic Uses

गन्धाश्माऽतिरसायनः सुमधुरः पाके कटूष्णो मतः। कण्डूकुष्ठविसर्पदद्रुदलनो दीप्तानलः तानलः पाचनः।।
आमोन्मोचनशोषणो विषहरः सूतेन्द्रवीर्यप्रदः। गौरी पुष्पभवस्तथा कृमिहरः सत्वात्मकः सूतजित्।। (R.R.S.3/16)

Rasa	Madhura (R.R.S.), Katu, Tikta (A.P)
Guna	Ushna, Sara, Snigdha

Veerya	Ushna
Vipaka	Madhura (R.C.), Katu (R.R.S, A.P)
Doshaghnata	KaphaVata hara, pittavardhaka
Karma	Deepana, Pachana, Amonmochaka, Vishaghna, Veerya prada to Parada, Krimighna, Rasayana, Deergha Ayushyakara, Drushti shakti vardaka, Twakdoshahara.
Prayoga	Kandu, Kushta, Visarpa, Dadru, Pama, Amadosha, Vishadosha, Bhootadosha, Krimiroga, Balakshaya, Mandagni, Netra roga, Kasa, Pleeha roga, Urdhwajatrugata Rogas

Dose

रक्तिकात: समारभ्य रक्तिकाष्टकसंमितम्। प्राणाचार्य: प्रयुञ्जीत गन्धकं तु विशोधितम्।। (R.T.8/39)

Shuddha Gandhaka can be administered by assessing the roga and rogi bala, from one ratti to eight ratti (125-1000 mg).

Anupana

Milk

Management of Ashuddha, Apakwa and Avidhee Sevanajanya Dosha of Gandaka

विकारो यदि जायेत गन्धकाच्चेत्तदा पिबेत्। गोघृतेनान्वितं क्षीरं सुखी स्यात् स च मानुष:।। (B.R.R.S.)

If any untoward effect observed by the ingestion of Gandhaka, the person should discontinue the treatment and advised to take sufficient quantity of Cow's milk along with the Cow's ghee till the toxic symptoms pacifies.

Pathya-apathya

जाङ्गलानि तु मांसानि छागलानि प्रयोजयेत्। लवणाम्लानि शाकानि द्विदलानि तथैव च।
स्त्रियश्चारोहणं यानं तदा चैतानि वर्जयेत्।। (A.P.2/49-50)

Pathya- Jangala pashu and pakshi mamsa, Aja mamsa, Cow's milk, Ghee and Rice.

Apathya- Kshara, Amla, Atilavana, Katu, Vidahi ahara, Green vegetables, Dicotyledons, Stree Sevana and Yana (Long journey).

Important Formulations (Yoga)

1. Kajjali
2. Rasa Parpati
3. Rasa Sindhura
4. Rasa Garbha Pottali
5. Gandhaka Rasayana
6. Makaradhwaja
7. Samirapannaga Rasa
8. Panchamruta Parpati
9. Gandakadya Malahara
10. Ananda bhairava Rasa

Research Updates

1. Kavita Shailesh Deshmukh et al. **Role of different media used in Gandhaka shodhana regarding analytical study.** Int. J. Res. Ayurveda Pharm. 2017;8 (Suppl 2):112-114

   Analysis of Gandhaka is useful to study the physicochemical changes occurring in Gandhaka after shodhana. After Shodhana, Bhanguratwa is increased and Rukshata is decreased. Colour of Gandhaka is changed and smell of Shodhya dravya is appeared. Weight of Gandhaka is slightly decreased,Melting point is increased but mostly similar in all media. SEM EDX shows C% is more in Godugdha and Goghruta and also high in Taila media but it is low in Dadima and Triphala kwatha. S% is high in Dadima and Triphala media. O% is high in Sarshapa Taila. It indicates that Properties of shodhya dravya affects the shodhana dravya. Chemical ingredients are changed. So, the different properties of Shodhana dravyas are observed.

2. Pramod Yadav et al, **A Comparative In-Vitro study to evaluate the Antibacterial and Antifungal activity of Raw and Processed Gandhaka,** Annals Ayurvedic Med. 2012 : 1 (4) 129-133

   The study showed that raw as well as Shodhita Gandhaka has antibacterial and antifungal activity. Antifungal activity in raw Gandhaka is more as compared to Shodhita samples. The study also concluded that there was no difference in antibacterial activity of raw and Shodhita samples of Gandhaka by different methods. As antimicrobial activity of raw and Shodhita Gandhaka were found to be very similar, it should be not mandatory to carry out Shodhana of Gandhaka for 7 times for external use. Only once Shodhana is sufficient before conversion of Gandhaka into an antibacterial/antifungal ointment.

3. Shetty P et al. **Gandhaka rasayana: possible role as a modulator of fibroblast cell function in wound healing;** Int J Health Sci Res;2020;10(6):36-45.

   Increased expression of metallothioneins was observed in fibroblasts treated with Gandhaka rasayana and also in A549 cells cultured in presence of CoM obtained from GR extract treated fibroblast cells. Results indicate the possible mechanism of Gandhaka rasayana by fibroblast activation and by modulation of the proteins involved in tissue remodeling.

4. Shankar Rao,**Clinical evaluation of Gandhaka druti and Gandhaka taila in Scabies: a comparative clinical study,** UJAHM 2014, 02 (01): Page 38-40

   The clinical study suggests that, the use of Gandhaka Druti and Gandhaka Taila in Pama as external application markedly subsidizes lesion and itching. Thus, Druti and Taila can be safely used in treatment of skin diseases especially in Pama.

Gairika (Red Ochre)

Synonyms

गैरिकं त्वथ गैरेयं, गिरिमृद् गिकिरमृत्तिका। रक्तधातुर्लोहधातुस्तदेव गिरिमृन्भवम्।। (R.T.22/110)

Gairika	Gaireya	Girimrit	Girimrittika
Rakta dhatu	Loha dhatu	Girimrdbhavam	

Vernacular Names

Sanskrit - Gairika

English - Ochre or Heamatite *or* Red oxide of Iron

Hindi - Sona Geru

Kannada - Gairika, Kavi Mannu

Minerological Identification

Haematite is one of the most abundant minerals on Earth's surface and in the shallow crust. It is ferric oxide and an important ore of Iron.

Properties

Chemical composition	Fe_2O_3
Colour	Red-brown. Metallic gray, dull to bright Rust-red
Luster	Metallic to splendent
Crystal habit	Tabular to thick crystals; Trigonal
Cleavage	None
Specific Gravity	4.8-5.2
Diaphaneity	Opaque
Hardness (Moh's Scale)	5.5 to 6.
Fracture	Uneven to Sub-Conchoidal
Streak	Red to reddish brown

Sources and Occurrence

Gairika is found with other iron minerals in igneous rocks, metamorphic rocks and sedimentary rocks. It is available in almost all parts of India, mainly in the mines present in Bihar, Orissa, Karnataka and Andhra Pradesh. Other than India, it is available in North America, Queba, Ontario, Brazil, Australia and South Africa.

Types

पाषाणगैरिकं चैकं द्वितीयं स्वर्णगैरिम्। पाषाणगैरिकं प्रोक्तं कठिनं ताम्रवर्णकम्।।
अत्यन्त शोणितं स्निग्धं मसृणं स्वर्णगैरिकम्। (R.R.S.¾6-47)

According to Rasendra Chudamani and R.R.S., Gairika is of 2 types:

1. Swarna Gairika- Snigdha, Masruna, Mridu and Rakta varna.
2. Pashana Gairika- Ruksha, Katina and Tamra varna.

Based on the colour, Gairika is classified into 3 types in Rasarnava:

1- Rakta 2. Hema 3. Kevala

Ayurveda prakashakara classified Gairika into 3 types:

1. Swarna Gairika 2. Samanya Gairika 3. Pashana Gairika

Grahya Lakshana/swaroopa

सुवर्णगैरिकं स्निग्धं मसृणं त्वतिकोमलम्। पाषाणगैरिकं रूक्षं कठिनं नातिलोहितम्।।
पाषाणगैरिकात् श्रेष्ठं कथितं स्वर्णगैरिकम्। अतः सर्वत्र मतिमान् योजयेत्स्वर्णगैरिकम्।। (R.T.22/112-113)

The characteristics of Swarna Gairika are:

1. Snigdha- Unctous/ Smooth to touch.
2. Masruna - Soft.
3. Ati komala - Very tender.

Whereas the characteristics of Pashana Gairika are:

1. Rooksha - Rough
2. Katina - Hard
3. Ati lohita - Deep red colour.

Swarna Gairika is said to be superior than Pashana Gairika. So the intelligent will use the Swarna Gairika for all therapeutic purposes.

Shodhana

I Method

गैरिकं तु गवां दुग्धैर्भावितं शुद्धिमृच्छति। (R.R.S.3/49)

Gairika will be purified by subjecting it to trituration with Cow's milk.

II Method

गैरिकं किञ्चिदाज्येन भृष्टं शुद्धं प्रजायते। (A.P.2/272)

By roasting the Gairika with Ghee, Gairika will become Shuddha.

S.No.	Drugs used	Method of Shodhana	Reference
1	Godugdha	Bhavana	R.R.S.3/49
2	Goghrta	Bharjana	A.P.2/272

Satwapatana

गैरिकं सत्त्वरूपं हि नन्दिना परिकीर्तितम्। कैरप्युक्तं पतेत्सत्वं क्षाराम्लस्विन्नगैरिकात्।। (R.R.S.3/50)

According to the RasAcharya Nandi, Satwapatana is not required for the Gairika as it itself is more effective as an essence. By swedana of Gairika in Kshara and Amla jala, Satwa can be extracted from Gairika.

Probable Physico-chemical Changes During Above Processing

There are different hypothesis postulated for gairika shodhana. The raw gairika, due to the presence of water and oxygen molecule increases the chances to have free ferrous irons, which is toxic as it generates free radicals. So when Gairika is roasted with ghee, ferrous iron is converted to ferric form. Fe+++ ions are absorbed easily and carried in the plasma by protein transferring.

In Bhavana method of Gairika shodhana, trituration of Gairika with milk is done till it completely get dries up. This technique minimises the poisonous character and increases the therapeutic efficacy of Gairika. So here shodhana process may increase the absorption rate in body. Because of the presence of impurities, purification processes are primarily designed to reduce toxicity to a body-tolerated level and to reduce toxic constituents, either by potentiating their chemical transformation to nontoxic or relatively less toxic substances or by improving their biological efficacy.

Properties and Therapeutic Uses

स्वादु स्निग्धं हिमं नेत्र्यं कषायं रक्तपित्तनुत्।
हिध्मावमिविषघ्नं च रक्तघ्नं स्वर्णगैरिकम्।। (R.R.S.3/47)

Rasa	Madhura, Kashaya
Guna	Snigdha
Veerya	Sheeta
Vipaka	Katu
Doshaghnata	Pitta hara
Karma	Netrya, Vishaghna, Raktasthambaka, Kanduhara, Balya, Vranaropaka, Jwaraghna, Dahahara.
Prayoga	Raktapitta, Hikka, Vamana, Visha, Pandu, Jwara, Netrarogas, Asrgdhara. Externally- Vrana, Kandu, Udarda.

Dose

द्विगुञ्जतः समारभ्य चतुर्गुञ्जमितं परम्।
सवर्णगैरिकं शुद्धं युञ्जीत भिषजां वरः।। (R.T.22/119)

Swarna Gairika can be administered from the dose of 2 Ratti to 4 Ratti (250-500 mg).

Anupana

Navaneetha, Ksheera with sharkara.

Important Formulations

1. Irimedadi Taila
2. Krimighatini Gutika
3. Pushyanuga Churna
4. Jatyadi Taila
5. Gairikadhya Pralepa
6. Pradarantaka Loha
7. Laghusootashekhara Rasa
8. Kamadudha Rasa
9. Jwarankusha Rasa
10. Nishadyanjana

Research Updates

1. Manjiri Ranade, **An analytical study of Gairika by two different methods of shodhana,** YMT Inter JASM; Volume - 1 Issue-2; July-December 2022

   Gairika shodhana is achievable with both godugdha and goghruta. ICP AES data indicates trace metal levels within permitted limits, indicating that themedication's toxicity is minimal.

2. Sharma Vinay et al., **Physicochemical Evaluation of Laghu Sutasekhara Rasa, Tablets with special reference to Gairika Shodhana,** SLJIM 2012 : 02(01) : 133-136

   Laghu Sutashekhara Rasa was prepared out of Shudha Gairika and Sunthi (Zingiber officinale Ros.) levigation with the Nagwalli patra swarasa. Standard Operating Procedure (SOP) of Laghu Sutashekhara Rasa is given and it was converted into granules and subjected for the tablet formation. The physicochemical parameters of tablets like average weight 496 mg, hardness 0.5 kg/cm3, disintegration time 35 min, total ash value 52.62, 1oss on drying 1.9, Acid insoluble ash 19.4, Water soluble extactive 50 and Alcohol soluble extractive 29 which are found in the standard range.

Kankshi (Alum)

Generally, it is known by the name Sphatika as it resembles the uparatna sphatika in its appearance. Apart from its therapeutic utility, it is used in the dying of clothes and for purification of water.

Synonyms

स्फटिकारिः स्फुटी चैव स्फटिका स्फटिकारिका। स्फुटिका फटिका चैव शुभ्रा काङ्क्षी च रङ्गदा।।
दृढरङ्गा रङ्गदृढा तथैव दृढरङ्गदा। तुवरी रङ्गदात्री च कथिता भिषजां वरैः।। (R.T.11/178-179)

Sphatikarikari	Sphuti	Sphatika	Sphatikarika	Sphutika
Phatika	Shubra	Kankshi	Rangada	Dhrudaranga
Rangadruda	Dhrudarangada	Tuvari	Rangadhatri	Sourashtri

Vernacular Names

Sanskrit - Sphatika

Hindi - Phitakari

English - Alum

Kannada - Pataga, Patika

Mineralogical Identification

Alum is a colourless, odourless and exist as a white crystalline powder. Most alums have an astringent and acid taste. They are generally soluble in hot water.

Properties

Chemical composition	$K_2SO_4\ Al_2(SO_4)_3 24H_20$
Colour	Colourless, White
Luster	Vitreous to pearly
Crystal habit	Large cubes or Octahedral, Isometric
Cleavage	Perfect
Specific Gravity	2.6 - 2.75
Diaphaneity	Transparent to translucent.
Hardness (Moh's Scale)	3.5 – 4
Fracture	Conchoidal
Streak	White

Sources and Occurrence

According to R.R.S., it is obtained from a special type of soil from Sourastra (Gujarat). In places where the soil contains Aluminum and Sulphur, the rocks of such places contains Alum in small or large amount. Sourastra is one such place recognised in India. Other places includes Punjab, Bihar, Goa, Maharashtra and Uttar Pradesh. Other than India, it is found in Italy, Nepal, United states, Philippines and in neighborhood of Volcanoes.

It is also prepared artificially in the laboratories. It can be obtained by treating a mixture of Aluminum sulphate and Sulfuric acid with ammonia. Alums occur naturally in various minerals, like Kalinite, Alunite and Leucite, which can be treated with sulphuric acid to obtain crystals of the alum.

Types

According to Rasarnava, Sphatika is of 2 types based on the colour and swaroopa:

1. Shweta - Kandatmika 2. Krishna - Churnarupa

फटकी फुल्लिका चेति द्वितीया परिकीर्तिता । (R.R.S.3/60)

According to Rasaratna Samuchchaya, Sphatika is of 2 types:

1. Phataki - Ishatpeeta 2. Phullika - Shubravarna

Grahya Lakshana/Swaroopa

ईषत्पीता गुरुः स्निग्धा पीतिका विषनाशनी। (R.R.S.3/60)

निर्भारा शुभ्रवर्णा च स्निग्धा साम्लाऽपरा मता। सा फुल्लतुवरी प्रोक्ता लेपात्ताम्रं चरेदियम्। (R.R.S.3/61)

Characteristics of Phataki sphatika are:

1. Ishatpeeta- Slight yellowish in colour
2. Guru- Heavy
3. Snigdha- Unctuous/Soft

Characteristics of Phullika sphatika are:

1. Nirbhara- Light.
2. Shubravarna- White colour.
3. Snigdha- Unctuous/Soft.
4. Amla- Sour taste.
5. By applying its paste on tamra, it turns into tamra bhasma.

Shodhana

I Method

तुवरी काञ्जिके क्षिप्त्वा त्रिदिनाच्छुद्धिमृच्छति। (R.R.S.3/64)

For purification of Sphatika, it should be soaked in Kanji for three days.

II Method

न दृष्टं शास्त्रतो, लोका वह्नवुत्फुल्लयन्ति हि।। (A.P.2/258)

Barjana of Kankshi is done for its purification. Bharjana is done till the water content get evaporate.

S.No.	Drugs used	Method of Shodhana	Reference
1	Kanji	Soaking for 3 days	R.R.S.3/64
2	Only sphatika	Bharjana	A.P.2/258

Marana

वह्नौ प्रोत्फुल्लयेत् किं वा सम्यग् लघुपुटे पचेत्। कुन्दवज्जायते भस्म सर्वरोगेषु योजयेत्। (Parada Samhita)

Shuddha Sphatika is confined to Sharava samputa and subjected to Laghu puta. This will yield the bhasma which is white in colour and this can be used in treating all diseases.

S.No	Drugs used	No. and Type of Puta	Reference
1	Only sphatika	Laghu puta	Parada Samhita

Satwapatana

I Method

क्षाराम्लैर्मर्दिता ध्माता सत्त्वं मुञ्चति निश्चितम्। (R.R.S.3/65)

Shuddha Sphatika is triturated with Kshara and Amla dravyas in Khalwa yantra

and bolus is prepared. After drying, it is enclosed in Musha and heated intensively to extract the Satwa from Sphatika.

II Method

गोपित्तेन शतं वारान्सौराष्ट्रीं भावयेत्ततः। धमित्वा पातयेत्सत्त्वं क्रामणं चातिगुह्यकम्।। (R.R.S.3/65)

Shuddha Sphatika is subjected to 100 Bhavanas with Gopitta and after enclosing within the Musha, it is heated intensively. By this the satwa get extracted out which is useful in the Kramana samskara of Parada.

Probable Physico-chemical Changes During Above Processing

During Shodhana of Kankshi, water portion is evaporated by bharjana method. Dry frying removes the unwanted moisture content and volatile matter. Higher the moisture content, the risk factor of cohesion and adhesion will be more. After shodhana, Kankshi attains desired chemical compound, crystalline kankshi will get converted to amorphous form.

Properties and Therapeutic Uses

काङ्क्षी कषाया कटुकाम्ल कण्ठ्या केश्या व्रणघ्नी विषनाशनी च।
श्वित्रापहा नेत्रहिता त्रिदोषशन्तिप्रदा पारदजारणी च।। (R.R.S.3/63)

Rasa	Kashaya, Katu, Amla
Guna	Guru, Snigda
Veerya	Ushna
Vipaka	Katu
Doshaghnata	Tridoshahara.
Karma	Kantya, Keshya, Vranaghna, Vishanashana, Netrahita, Paradajarini, Vranashodhini, Sankochakari, Rudirasravarodaka, Mukharogahara, Grahi, Svitranashaka
Prayoga	Svitra, Kushta, Vrana, Garavisha, Kaphajaroga, Netraroga, Urahkshata, Kshaya, Shoola, Visarpa, Raktasrava

Dose

2-4 Ratti (250-500 mg) for internal administration with sugar.

Important Formulations (Yoga)

1. Shwetaparpati
2. Eladi Mantha
3. Garudanjana
4. Chatusudha Rasa
5. Shankadravaka Rasa

Research Updates

1. Dr. Ritesh P et al, **Haemostatic effect of Sphatika in Raktarsha- A Pilot Study,** IRJHIS; Volume 3; Issue 3; March 2022

The study shows that Sphatika is an effective local haemostatic agent in controlling bleeding piles. Sphatika solution exerts its astringent and haemostatic effect through a chemical reaction with blood proteins which results in controlling the bleeding. It is also safe, cost effective and easily accessible way to arrest the bleeding in arsha.

2. Dr. Anuya Aparna Rege, **In Vitro evaluation of Antibiofilm Potential of Alum (Sphatika) & it's Bhasma (Sphatika Bhasma) against mixed Bacterial Biofilms,** WJPPS, Vol 12, Issue 2, 2023.

In the present in vitro study, antimicrobial and antibiofilm potential of Alum (Sphatika) and it's Bhasma (Sphatika Bhasma) was evaluated against mixed bacterial cultures prepared from 4 gram negative bacteria, 4 gram positive bacteria and mixture of all 8 bacteria using various assays. Overall, Sphatika Bhasma revealed the highest inhibitory potential against biofilms of all 3 mixed cultures when tested alone. The said activity was better than that of Alum and the combinations included in the present study.

Haratala (Orpiment)

Synonyms

हरितालं मतं तालं तालकं नटभूषणम्। नटमण्डनकञ्चापि मतं शैलूषभुषणम्।।
विडालकं चित्रगन्धं पिञ्जरं वंशपत्रकम्। आलं पीतकञ्चापि कथितं मल्लगन्धजम्।
तालकं जायते यस्मान्मल्लगन्धकमिश्रणत्।। (R.T.11/1-3)

Haritalam	Talam	Talakam	Natabhushanam	Nata Mandanaka
Shailush bhushanam	Vidalakam	Chitragandham	Pinjaram	Vanshapatrakam
Alam	Peetanakha	Mallagandhajam	Mallagandhaka	Peetanakham
Vangari	Romaharam	Vidalam		

Vernacular Names

Sanskrit - Haratala
English - Orpiment or Yellow arsenic
Hindi - Haratala
Kannada - Haritala
Latin - Arsenii trisulphidum
Chemical formula - AS_2S_3

Minerological Identification

Arsenic trisulphide (AS_2S_3) occurs in nature as the mineral orpiment- a term derived

from the Latin auri-pigmentum, golden paint because of its deep- yellow colour. Arsenic trisulphide is a bright yellow, solid, insoluble in water, but 'soluble' in alkali hydroxides, ammonium carbonate and alkali sulphide.

Properties

Chemical composition	AS_2S_3. As - 60.90% & S - 39.10%
Colour	Lemon-Yellow to golden or brownish yellow
Luster	Resinous, pearly on cleavage surface
Crystal system	Monoclinic
Cleavage	Perfect
Specific Gravity	3.49
Diaphaneity	Transparent to translucent.
Hardness (Moh's Scale)	1.5-2
Fracture	Sectile
Streak	Pale lemon- yellow

Sources and Occurrence

Arsenic is not available in India in abundant quantity. So it is imported from countries like Italy, Iran, Burma and China. In India it is available at Culcutta and Surat in small quantities. Artificially it is prepared by heating arsenic and sulphur together, in anaerobic condition.

CHAPTER EIGHT

Types

हरितालं द्विधा प्रोक्तं पत्राद्यं पिण्डसंज्ञकम्। (R.R.S.3/66)

There are mainly two types of Haratala:- 1. Patra Haratalam 2. Pinda Haratalam

According to Bhava Prakasha, Haratala is of 4 types :-

1. Patra Haratala
2. Pinda Haratala
3. Godant Haratala
4. Vakadal Haratala

Grahya Lakshana

स्वर्णं गुरु स्निग्धं तनुपत्रं च भासुरम्। तत्पत्रतालकं प्रोक्तं बहुपत्रं रसायनम्।। (R.R.S.3/66)

Patra haratala is grahya Haratala. Its characteristics features are:

1. Swarna varna- Gold coloured
2. Guru - Heavy
3. Snigdha - Unctuous/soft to touch
4. Tanu patra - Small and thin layers
5. Basura - Shining and bright

Patra haratala with above features is said to be good for therapeutic purpose and that which has more number of layers is consumed as Rasayana.

Agrahya Lakshana

निष्पत्रं पिण्डसदृशं स्वल्पसत्त्वं तथा गुरु। स्त्रीपुष्पहरणं गुणाल्पं पिण्डतालकम्।। (R.R.S.3/67)

Pinda Haratala is not recommended because of its inferior quality. Its characteristics features are:

1. Nishpatra - without layers
2. Pinda sadrusha - massive
3. Swalpa satwa - little essence
4. Guru - heavy; Laghu- light (R.T)
5. Gunalpa - less quality

Pinda haratala is said to be Sthreepuspahara, so not used for therapeutic purpose

Ashuddha Haratala sevanajanya dosha

अशुद्धं तालमायुघ्नं कफमारुतमेहकृत्। तापस्फोटअङ्गसंकोचं कुरुते तेन शोधयेत्।। (R.R.S.3/ 69)

Ingestion of Ashuddha Haratala causes:

1. Kapha and vata rogas (Disorders of Vata and Kapha doshas).
2. Prameha (Diabetes and other urinary disorders).
3. Tapa (Increase in body temperature).
4. Sphota (Blisters over skin).
5. Anga sankocha (Contraction of body organs and muscles).

Shodhana

I[st] Method

स्विन्नं कूष्माण्डतोये वा तिलक्षारजलेऽपि वा। तोये वा चूर्णसंयुक्ते दोलायन्त्रेण शुध्यति।। (R.R.S.3/ 70)

Haratala get purified by subjecting it to swedana in Dolayantra with Kushmanda swarasa or Tilakshara jala or Churnodaka for 3 hours.

II[nd] Method

चूर्णीकृतं पत्रतालं चूर्णनीरेण भावयेत्। सप्तवारं प्रयत्नेन शुद्धिमायात्यनुत्तमाम्।। (R.T.11/25)

By triturating the powdered Patra haratala with Churnodaka for 7 times, haratala will become pure.

S.No.	Drugs used	Method of Shodhana	Reference
1	Kushmanda swarasa/ Tilakshara jala/Churnodaka	Swedana in Dolayantra	R.R.S.3/70 R.T.11/20-22
2	Churnodaka	Bhavana for 7 times	R.T.11/25
3	Tila taila/Triphala kwatha	Swedana in Dolayantra for 12 hours	A.P.2/183

4	1 Haratala + 1/10 Tankana	Washed with Jambeera Rasa and Kanji and swedana with Jambeera Rasa and Kanji for 1 day	R.R.S.3/71-72

Marana

I[st] Method

मधुतुल्ये घनीभूते कषाये ब्रह्ममूलजे। त्रिवारं तालकं भाव्यं अवि मूत्रऽथ माहषे।।
उपलैर्दशभिर्देयं पटं रुद्धध्वाऽथ पेषयेत। एवं द्वादशधा पाच्यं शुद्धं योगेषु योजयेत्।। (R.R.S.3/74-75)

Palasha moola kashaya is further boiled to make it thick like Madhu (consistency like honey). This kashaya is used to give bhavana to Shuddha Haratala. Such 3 bhavanas are given and another bhavana is given with Buffalo's urine and chakrikas are prepared. Chakrikas are dried, confined to Sharava samputa and subjected to puta using 10 Vanopalas. Entire procedure is repeated for 12 times to obtain the good quality bhasma which can be used in various formulations.

II[nd] Method

विमलं पत्रतालन्तु तत्तुल्या मृतशुक्तिका। खल्वे सम्पेषयेद्यामं कुमारीस्वरसेन वै।।
निर्माय चक्रिकां तस्य शोषयेदातपे भिषक्। शरावसम्पुटे न्यस्य ततो लघुपुटे पचेत्।।
स्वाङ्गशीतं ततो ज्ञात्वा भस्म निश्चन्द्रिकं हरेत्।। (R.T.11/39-41)

Shuddha Haratala is taken along with the equal quantity of Shukti bhasma in Khalwa yantra rubbed well and subjected to bhavana with Kumari swarasa for 3 hours. Chakrikas are prepared, dried in sun and enclosed in Sharava samputa. This is subjected to Laghu puta and after complete burning of vanopalas, allowed for swangasheeta and lustourless bhasma is collected which can be used for therapeutic purposes.

S.No	Drugs used	No. and Type of Puta	Reference
1	Thick Palasha moola kashaya and Mahisha mootra for bhavana (3+1)	12 Putas with 10 Vanopalas for each puta	R.R.S.3/74-75
2	Pippala twak kwatha - bhavana for 21 times	Heated in Bhasma yantra (filled with pippala twak bhasma) for 12 hours	R.T. 11/30-34
3	Arka dughda - for bhavana	Heated in Bhasma yantra (filled with Palasha twak bhasma) for 12 hours	R.T. 11/35-38
4	Shuddha Haratala + Shukti bhasma; Kumari swarasa for bhavana	Laghu puta	R.T. 11/39-41

Haratala Bhasma Pareeksha

तालं मृतं तदा ज्ञेय वह्निस्थं धूमवर्जितम्। सधूमं न मृतं प्राहुर्वृद्धवैद्या इति स्थिति:।। (A.P.2/180)

To test the Haratala bhasma, it should be put over the fire. If it burns without any smoke, it is considered to be the properly incinerated bhasma. If it burns with smoke, then the bhasma is considered to be not properly incinerated.

Satwapatana

पलालकं रवेर्दुग्धैर्दिनमेकं विमर्दयेत्। क्षिप्त्वा षोडशिकातैले मिश्रायित्वा तत: पचेत्।
अनावृतप्रदेशे च सप्तयामावधिध्रुवम्। स्वाङ्गशीतमध: स्थञ्च च सत्त्वं श्वेतं समाहरेत्।। (R.R.S3/80-81)

One pala (48 gms) of Shuddha Haratala is triturated with the latex of Arka for a whole day. Trituration is continued by adding 16 parts of Tila taila. Then the mixture is filled inside the glass bottle and it is subjected to heat for 7 Prahara (21 hours), in the Valuka yantra. After self cooling, the satva which is white in colour is collected from the bottom of the bottle.

Probable Physico-chemical changes during above processing

After shodhana process, Haratala becomes less toxic as it undergoes swedana in dolayantra with Kushmanda [Benincasa hispida (Thunb.)] Swarasa or other dravas. The purpose of doing Swedana may be attributing the properties of Swedana Dravya to Swedya Dravya. The chemical reactions that take place during the Swedana process may be due to diffusion and Osmosis. Kushmanda is an antidote for Haratala poisoning. Studies have shown that cucurmosin is an active compound in Benincasa hispida, a kind of ribosome-inactivating protein and has high rate of cell apoptosis. Hence, purification by the above agents might reduces the toxic effect and also enhance the synergistic effect of Haratala in cellular apoptosis for the treatment of diseases.

Solvent media helps to eliminate toxic chemical substance from the drug. Haratala, sometimes found mixed with Gauripashana (As_2O_3), which is a highly toxic substance. So, when Churnodaka (lime water) is used for Haratala Shodhana, Gauripashana readily dissolves in solutions of alkalis (like Churnodaka) and eliminate highly toxic Gauripashana from Haratala.

During Bhasmikarana process under high heat, sulfur gets evaporated from sulfur-containing arsenic minerals and oxygen content increases. Palbag et al. proved that after Bhasmikarana of Haratala, apart from sulfur and arsenic, Haratala Bhasma also contains oxygen with wt% of 13.56, due to the formation of oxides of arsenic.

Properties and Therapeutic Uses

हरितालं कटु स्निग्धं कषायोष्णं हरेद्विषम्। कण्डूकुष्ठदिरोगास्त्रकफपित्तकचव्रणान् ।। (A.P. 2/176)

Rasa	Katu, Kashaya, Tikta
Guna	Snigdha, Ushna, Guru

Veerya	Ushna
Vipaka	Katu
Doshaghnata	Kaphavata hara
Karma	Angadeepaka, Balakaraka, Kantikara, Pustikara, Rasayana, Ojokara, Mrutyuhara, Vishaghna, Bhootabadhanashaka
Prayoga	Kandu, Vatarakta, Raktapitta, Sleepada, Phiranga, Vata Rakta, Visarpa, Dadru, Pama, Vipadika, Vicharchika, Vishama Jwara, Kasa, Shwasa, Jwara, Kshaya, Prameha, Gudaroga, Vrana, all types of kushtas.

Dose

पादांशतो रक्तिकायः रक्तिकार्द्धमितं परम्। विमलं च मृतं तालं प्रयुञ्जीत भिषग्वरः।। (R.T.11/56)

Shuddha Haratala and Haratala bhasma can be administered in the dose of ¼-½ Ratti (31-62 gms).

Anupana

Guduchi kashaya, Madhu, Ghrta.

Management of Ashuddha, Apakwa and Avidhee Sevanajanya Dosha of Haratala

ससितं जीरकक्षोदं कूष्माण्डस्वरसेन्तु वा। अश्नीयात्तालविकृतौ त्रिवारं त्वेकवासरे।। (R.T.11/103)

If any untoward effect observed by the ingestion of Haratala, the person should discontinue the treatment and advised to take Kooshmanda swarasa along with Sugar and Jeeraka churna three times a day for 1 week.

CHAPTER EIGHT

Pathya-apathya

While administering the Haratala bhasma, Vaidya should advice the person to avoid Lavana, Amla and Katu rasa dravyas and exposure to sun. If the person cannot avoid the lavana, then he can advised to take Saindava lavana.

Important Formulations

1. Talakeshwara Rasa
2. Tala Sindoora
3. Kasturi bhairava Rasa
4. Sameera pannaga Rasa
5. Rasa Manikya
6. Gulmakalanala Rasa
7. Ashwakanchuki Rasa
8. Sutika bharana Rasa
9. Vatagajankusha Rasa
10. Nityananda Rasa

Research Updates

1. Bandeppa Sangolgi et al., **Physico-chemical analysis of Haratala w.s.r. to its various Shodhana procedures.** J Ayurveda Integr Med Sci 2017;2:88-97.

   All relevant analytical data of samples of Ashuddha and Shuddha Haratala are showing difference in their physical and chemical values. It shows the importance

of process of Shodhana, which is probably responsible for safe therapeutic uses of Haratala. This shows the role of different media in deciding the absorption, assimilation, effect and excretion of the drug. So due to these there may be changes in mode of action and also disease and disease condition. The properties of liquid media embedded into the Haratala during the process of Shodhana may augment the effect of Haratala.

2. Palbag S et al., **Comparative physico-chemical validation between Arsenic-based Indian traditional drugs Haratal Bhasma and Rasamanikya.** J Ayu Herb Med 2016;2(2):43-48.

   There were minimal comparative differences found in the Haratala Bhasma and Rasamanikya, but Haratala Bhasma showed better results from the standardization point of view.

3. Dr. Shanker S. Mishra et al. **Comparative Subacute Toxicity Study of an Ayurvedic Formulation Hartal (Orpiment) and Rasa Manikya (Processed Product of Hartal) in Albino Mice**, Ijppr. Human, 2017; Vol. 8 (3): 292-303. 302

   In present study, it is concluded that Impure Haratala is toxic to liver, kidney and also causes ulceration in GIT tract. It also depilates the hair. While pure Haratala is completely non-toxic to kidney, liver and could be recommended for therapeutic purposes for a month safely. Rasa Manikya is found mild toxic to kidney and liver in some cases as it increases serum SGOT, SGPT and Creatinine level. Study suggests that detoxification or shodhana really works in reduction of toxicity by removing contamination and some others way.

4. Sourav Ballav et al. **Toxicological and human risk assessment of haratala (orpiment/ AS_2S_3).** Int. J. Res. Ayurveda Pharm. 2019;10(1):55-58

   The experimental animal model showed solubility of Haratal (Orpiment/Arsenic trisulphide) is very low in water and it is poorly absorbed in gastrointestinal tract of Wistar albino rats. Haratala is expelled through urine and fecal matter due to fate of poison. So only a small portion of arsenic trisulphide was absorbed and reached to the blood stream which was not adequate to produce acute toxicity and orally safe up to 5gm/kg body weight of Wistar albino rats.

5. Naresh Thondare, **Analytical study of Haratala bhasma and it's therapeutic efficacy on Vicharchika,-** PG dissertation, Rajiv Gandhi University of Health Sciences (India)

   Haratala Bhasma is alone effective in treatment of Vicharachika. Haratala Bhasma is significantly effective in Kandu, Pidaka and Rookshata in the patient of Vicharchika

Manahshila (Realgar)

Synonyms

मनःशिला रोगशिला शिला नैपालिका तथा। मनोगुप्ता मनोज्ञा च मनोह्वा नागजिह्विका।।
कुनटी कुलटी गोला नागमाता च सा मता।। कल्याणिका च सैवेह कथिता रसनेत्रिका।। (R.T.11/104-105)

Manashila	Rogashila	Shila	Naipalika	Manogupta
Rasanetrika	Manoghna	Manohva	Nagajihvika	Kunati
Kulati Gola	Nagamaata	Kalyanika	Saiveha	Karanji
Nepali	Nepalaja	Nagamata	Goni	Divyoushadhi
Karaveerika	Rasagandhaka	Lakshmiveerya		

Vernacular Names

Sanskrit - Manahshila
Hindi - Mainasila
English - Realgar, Red orpiment
Kanada - Manishile, Manasil
Latin - Arsenicum rubram

Minerological Identification

Arsenic disulphide is a naturally occurring form of Arsenic and is found as realgar, one of the major Arsenic containing minerals. Arsenic disulphide is insoluble in water and so poorly absorbed. It therefore represents a much less acute toxic hazard than soluble Arsenic compounds.

Properties

Chemical composition	AS_2S_2; Arsenic - 70.1%; Sulphur - 29.9%
Colour	Orange to red
Luster	Resinous, adamantine to sub-metallic
Crystal habit	Monoclinic crystals -prismatic
Cleavage	Good in one direction
Specific Gravity	3.5 - 3.6
Diaphaneity	Translucent to transparent
Hardness (Moh's Scale)	1.5 - 2
Fracture	Subconchoidal
Streak	Orange to orange-yellow

Source and Occurrence

Realgar mainly occurs associated with orpiment (Haratala). It occasionally occurs in its pure form. It is most commonly found in chemical combination with sulphur or oxygen or with such metals as cobalt, copper, iron, nickel, silver and tin. It is available in south part of China, Spain, Burma, Switzerland, Japan, USA, Iran and in India, Munashiyari a place in Kumayi district of Uttar Pradesh. It occurs as a deposit in hot springs and as a volcanic sublimate. It is common in veins of mines where it may occur as nests or nodules in clay or associated with cinnabar.

Types

मनःशिला त्रिधा प्रोक्ता श्यामाङ्गीं काणवीरका। खण्डाख्या चेति तद्रूपं विविच्य परिकथ्यते।।
श्यामा रक्ता सगौरा च भाराढ्या श्यामिका मता। तेजस्विनी च निर्गौरा ताम्रभा कणवीरका।।
चूर्णीभुताऽतिरक्तङ्गी सभारा खण्डपूर्थिका। उत्तरोत्तरतः श्रेष्ठा भूरिसत्त्वा प्रकीर्तिता।। (R.R.S.3/88-90)

Three types of Manashila are explained by almost all the Acharyas.

According to R.R.S., types of Manashila are :

1. Shyamangi- Shyama (Blackish), Rakta (red), Goura (yellowish white) colour, Heavy- superior quality.
2. Kanaveeraka- Tamrabha (Coppery red) colour, devoid of Goura (yellowish white) colour, Tejasvi (Bright) - Medium quality.
3. Khandakhya- Ati rakta (Bright red) colour, Heavy, can be easily powdered - Inferior quality.

According to A.P., Manashila is of 3 types:

1. Shyama- It is Hingula sadrusha Raktavarna (reddish like Hingula), slightly yellow in colour and is shining- superior quality.
2. Kanaveera- Red in colour, heavy and is in powder form-. Medium quality.
3. Dwikhandakhya- Slightly reddish yellow in colour, heavy- Inferior quality.

Grahya Lakshana

मनःशिला शिलाखण्डशून्या रक्तोत्पलप्रभा। भारे गुरुतरा दीप्ता शोधनार्हा मता बुधैः।। (R.T.11/106)

Genuine Manashila will have following characteristics:

1. Shilakhanda shoonya - devoid of stones and sand.
2. Raktotpala - as red as utpala (Lotus) flower.
3. Bhare gurutara - heavy.
4. Deepta - shiny.

Ashuddha Manashila Sevanajanya Dosha

अश्मरीं मूत्रकृच्छ्रं च अशुद्धा कुरुते शिला। मन्दाग्निं मलबन्धं च शुद्धा सवरुजापहा।। (R.R.S.3/92)

When Manahshila used internally without proper purification it leads to many doshas like:

1. Ashmari (Renal stone)
2. Mutrkricchra (Painful Micturation)
3. Mandagni (Decreased digestive power)
4. Malabandha (Constipation)

Shodhana

I Method

अगस्त्यपत्रतोयेन भाविता सप्तवारकम्। शृङ्गवेररसैर्वाऽपि विशुद्धयति मनःशिला।। (R.R.S.3/93)

Manashila get purified by subjecting it to Bhavana with Agasthya patra swarasa or Ardraka swarasa for 7 times.

II Method

सुधोदके निपातिता मनःशिला तु चूर्णिता। दिनत्रयाद्विनिर्गता भवेत्तु दोषवर्जिता।। (R.T.11/109)

Manashila when soaked in churnodhaka for 3 days get devoid of its Doshas (blemishes) and becomes purified.

S.No.	Drugs used	Method of Shodhana	Reference
1	Ardraka Swarasa/Agashtyapatra Swarasa	Bhavana for 7 times	R.R.S.3/93
2	Jayanti swarasa, Bringaraja and Rakta agashtyapatra swarasa Ajamootra Aranala Kshalana (Washing)	Swedana in Dolayantra for 3 hours	R.R.S.3/94
3	Sudhodaka	Sthapana for 3 days	R.T.11/109
4	Bhringaraja Swarasa	Swedana in Dolayantra for 12 hours	R.T.11/110
5	Beejapoora Swarasa	Bhavana for 7 times	R.T.11/111
6	Jayanti Swarasa	Swedana in Dolayantra for 12 hours	R.T.11/112

Marana

Expect in very few recent books, Manahshila Marana is not mentioned in any major Rasagranthas. According to Rasendra sambhava, Manashila should be triturated with Hamsapadi, Vandala, Vata Ksheera, Snuhi Ksheera and Arka Ksheera separately with each drug for a day in the respective order. Then, it is subjected to puta (laghu). Such seven putas turns Manahshila into Bhasma.

S.No	Drugs used	No. and Type of Puta	Reference
1	Hamsapadi, Vandala, Vata Ksheera, Snuhi Ksheera and Arka Ksheera for bhavana	7 putas (Laghu)	Rasendra sambhava

Satwapatana

अष्टमांशेन किट्टेन गुडगुग्गुलुसर्पिषा। कोष्ठयां रुद्धवा दृढं ध्माता सत्त्वं मुञ्चेन्मनःशिला। (R.R.S. 3/95)

One part of Manahshila and 1/8th part each of Mandura, Guda, Guggulu and Sarpi are taken in Khalva, mixed and triturated. Then the mixture is enclosed in Moosha and kept in Kosti and heated intensively. By this Manahshila Satwa is extracted out.

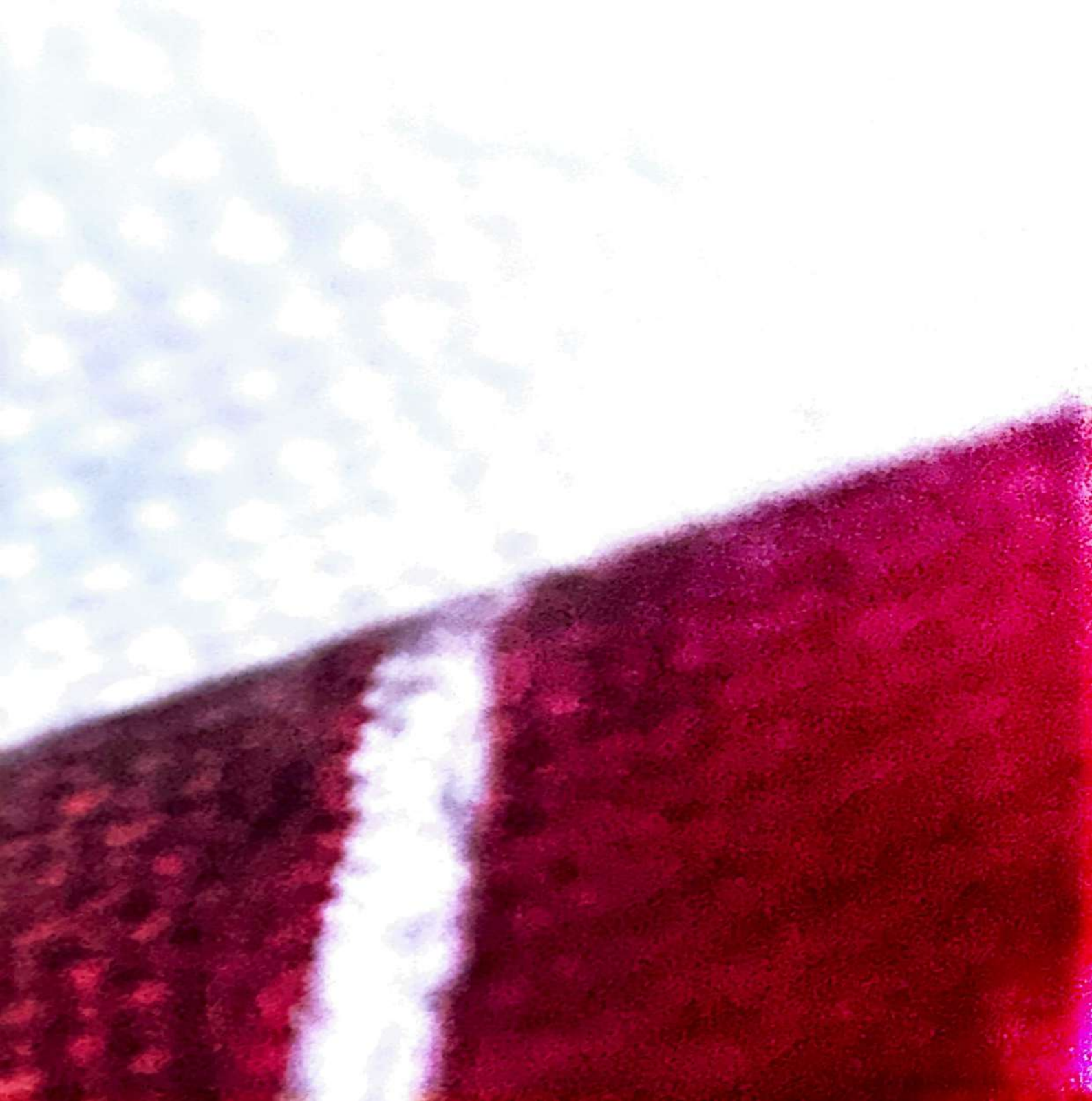
Probable Physico-chemical changes during above processing

For Shodhana of Manahshila, procedure of Bhavana is commonly employed. Bhavana is wet trituration by the means of specified liquid media for a specific duration of time, which leads to removal of impurities present in mineral (Manahshila) and also leads to impregnation of therapeutic principles of liquid media in the Mardita Dravya (Manahshila). It can also be assumed that the liquid media not only add their therapeutic properties but also chelated the toxic substances present in the drug material.

Bhavana process involves breaking down of material by rubbing action between two surfaces to produce small particles, so it causes reduction in Particle Size. In studies done on Manashila, Particle size of Ashuddha Manashila was 54.18 μm while that of Ardraka swarasa Shodhita Manashila was 15.55 μm which indicates that after Shodhana there was significant reduction in size of the particle. Impregnation of properties of media to the material which lead to unique and suitable physicochemical changes. In another study, it was also showed that the extract of ginger juice decreased the elevated character of NFκB and TNF-α.

Bhavana process also induces trace elements from the media used. When Manashila shodhana is done by Agastya swarasa bhavana, Shodhita Manashila shows presence of trace elements like Iron, Silica, Potassium, Calcium, Zinc, Manganese, Copper, Chromium, Magnesium, Sulphur in varied quantities. Organic encapsulation takes place, where organic components of the liquid media are transferred to the material to make it organometallic or organo-mineral compounds, which are favourable to the body.

Shodhana with Bhavana method using different media facilitates the size reduction which increases the particle surface area, enhances safety, potency, and also reduces the toxicity. Shodhana of Manahshila by ginger juice, sesbania leaves juice, and lemon juice involves numerous affirmative features. Detoxification of heavy metals by chelation is done by phytochelatins. These phytochelatins are heavy metal-binding peptides. There are four types of sulfur containing amino acids (taurine, cysteine, homocysteine, and methionine). But, only cysteine and methionine are incorporated into proteins. Manahshila may be turned into arsenic nontoxic by these phytochelatins. Methylation is facilitated by methyl donor peptide in ginger known as cysteine. By the methylation process, all the Shodhana media (except lime water) does detoxifying of arsenic in the body through hastened excretion. In this process, addition of a



methyl group to the arsenic and alters it into a nontoxic form in the liver is [illegible] this process then excreted out. In Manashila shodhana by Ardraka, Cysteine [illegible] the donor peptide. All the Shodhana media (except lime water) act as preservative glutathione, which is an important detoxifying compound present in the blood. It also acts as natural antioxidant recycling enzyme which unites with arsenic and excrete it through the bile. The level of glutathione is reduced by arsenic poisoning in the blood. The purification media may be acts as a cumulative approach, which increase the amount of glutathione in the blood.

Properties and Therapeutic Uses

मनःशिला गुरुर्वर्ण्या सरोष्णा लेखनी कटुः। तिक्त स्निग्धा विषश्वासकासभूतकफास्रानुत्।। (A.P.2/213)

Rasa	Katu, Tikta
Guna	Guru, Snigdha, Ushna
Veerya	Ushna
Vipaka	Katu
Doshaghnata	Kapha Vata hara
Karma	Lekhana, Rasayana, Vishaghna, Shoshana, Varnya, Kanduhara, Bhootopadravanashini, Agnideepaka, Kamakara
Prayoga	Kasa, Shwasa, Ati Kandu, Agnimandya, Bhutavesa bhaya, Visharoga, Kushta, Netra Vikaras, Apasmara, Chardi, Jwara, Anaha

CHAPTER EIGHT

Dose

तत्त्वांशतो रक्तिकायः कलांशप्रमितां तथा। शिला मात्रा विनिर्दिष्टा काशीनाथाभिषक्तमः।। (R.T.11/117)

Dose of Manahshila is 1/32 - 1/16 Ratti (4-8 mg).

Management of Ashuddha, Apakwa and Avidhee Sevanajanya Dosha of Manashila

शिलाविकारोपहतः पिबेत्क्षीरं दिनत्रयम्। मधुना पथ्यसंयुक्तो वान्त्यादिभ्यो विमुच्यते।। (R.T.11/125)

In case of any untoward effects of Manashila observed, then Cow's milk with honey should be taken for three days. If this is administered along with proper pathya, Vanti and other toxic symptoms will be relieved.

Important Formulations (Yoga)

1. Kalanala Rasa
2. Trilokya Chintamani Rasa
3. Manahshiladyanjana
4. Manahshiladya Dhooma
5. Mrita Sanjeevini Rasa
6. Rasa Raja Rasa
7. Shwasa Kutara Rasa
8. Sameera Pannaga Rasa
9. Chandrodaya Varti
10. Kshaya kesari Rasa

Research Updates

1. Vineet Sharma et al, **Comparative evaluation of anti-inflammatory activity of Manahshila (Realgar);** Journal of Complementary Medicine Research, 2019;10;1;1-12

   The Ashodhita Manahshila (crude realgar) showed mortality, while Shodhita Manahshila (purified with all four media) did not showed mortality in the treated rats up to a dose of 2,000 mg/kg. Ashodhita and Shodhita Manahshila revealed that at the dose level of 1.4 mg/kg it showed inhibition ($p < 0.05$) of egg albumin-induced hind paw edema. But, Shodhita Manahshila showed anti-inflammatory activity at all three dose levels in a dose-dependent manner. The ginger juice treated Manahshila (56.60%) was found best in alleviating rat's response to egg albumin-induced inflammation among all the group.

2. Dr. Suresh Y et al., **Analytical study of modified Manashiladi Lepa into Ointment.** J Ayurveda Integr Med Sci 2020;4:57-61.

   With respect to the preparation of Manashiladi Lepa into modified ointment form, itis seen that the modification is needed in the present times to improve the shelf life of the product, easy packing and better acceptability by the patients. The ointment has undergone various analytical tests to justify its modification and show that it can replace the original Lepa form in the present era.

3. Naveena Kodlady et al, **Sedative Hypnotic Activity of Manahshila (Realgar)- An Experimental Evaluation,** Ancient Science of Life, Vol. 30, No.3 (2011) 78–83.

   Ardraka Shodhita Manahshila possesses sedative hypnotic activity confirmed through animal experimental models particularly by reduction of spontaneous motor activity assessed through actophotometer method and potentiating the diazepam induced sleeping time.

Kampillaka (Mallotus Philippinensis)

Kampillaka has been listed as the first amongst the Sadharana rasas. Kampillaka is the herbal drug. As it is used in the pharmaceutical processing of Parada, this is included among rasa drugs and categorised in the group of Sadharana rasa.

Synonyms

Kampillaka	Kapila	Raktanga	Rechaka	Raktachurnaka
Lohitanga	Karkasha	Ranjana	Rochana	Chandra
Kampilya	Nadivaso	Raktaphala	Bahupatra	Bahuphalah
Bahupuspa	Vrana shodhana	Laghu patraka	Pikaksha	Rakta shamana

Vernacular Names

Sanskrit - Kampillaka

methyl group to the arsenic and alters it into a nontoxic form in the liver is taken by this process then excreted out. In Manashila shodhana by Ardraka, Cysteine-methyl is the donor peptide. All the Shodhana media (except lime water) act as preservation of glutathione, which is an important detoxifying compound present in the blood. It also acts as natural antioxidant recycling enzyme which unites with arsenic and excretes it through the bile. The level of glutathione is reduced by arsenic poisoning in the blood. The purification media may be acts as a cumulative approach, which increased the amount of glutathione in the blood.

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Bahupuspa	Vrana shodhana	Laghu patraka	Pikaksha	Rakta shamana

Vernacular Names

Sanskrit - Kampillaka

English - Indian Kamala

Hindi - Kamala

Kannada - Kapilehitha

Latin : Mallotus phillippinensis

Family : Euphorbiaceae.

Identification

Different Opinions About Kampillaka

- Vagbhata has described it to be red in color resembling the brick powder which is a strong purgative.
- Synonyms of Kampillaka like raktanga, raktachurna, reci, rechanaka, lohitanga etc. states two most important qualities of kampillaka that is its red color and its purgative effect. Another description about it is it occurs in Gujarat. From these narration it is clear that some substance in Gujarat which is red in colour and has got strong purgative effect has been addressed as kampillaka. The Gaj series beds found extended into Kathaiwar and Dwaraka in Sourastra. These beds contain yellow and brown limestone's either massive rubby, with intercalations of white Arenaceous Limestones, clays and gypsum. Many of these rocks are red in colour and specially shales and sand stones with magnesian content would have been used by rasavaidyas as kampilla.
- According to Rasa darpana (6th chapter), it is shiny mud which is raktavarna available in hilly region of Saurastra.
- Acharya Dharmananda Sharma quotes others opinion as It is vidanga phalaraja, which varies in properties and will be lighter than weight of Kampillaka.
- According to J.L.N. Shastri, the Kampillaka have two sources: Herbal and Mineral. So the Kampillaka of Rasashastra and Dravyaguna may be entirely different. Kampillaka of Rasashastra may be a variety of clay (red coloured) used in Gujarat as Purgative and Herbal source is Mallotus phillippinensis.

  But now a days, market available Kampillaka is the phalaraja of the tree Indian Kamala (Latin name- Mallotus phillippinensis).

Description

The tree is of 25 to 30 feet height Leaves are of 3 to 9 inch in length, Ovate, pubescent with sharp end. Flowers are small height and grayish red in colour. Fruit is small and round like a vidariphala. It has three layers, which when ripened is found covered with a powder like a sand of red colour. Seeds are smooth and rounded.

Fruit covering collected is known as Kampillaka. When the fruits ripe completely

they become fully covered with the red covering which may be collected with the help of cloth or hand. It is reddish in color.

Sources and Occurrence

सौराष्ट्रदेशे चोत्पन्नः स हि कम्पिल्लकः स्मृतः। (R.R.S.3/122)

As per the classics it is available in Sourashtra desha (Gujrat).

Grahya Lakshana/Swaroopa

इष्टिकाचूर्णसंकाशश्चन्द्रिकाढ्योऽतिरेचनः। सौराष्ट्रदेशे चोत्पन्नः स हि कम्पिल्लकः स्मृताः।। (R.R.S.3/122)

Characteristics of the best Kampillaka are:

1. Ishtika churna sankasha- like brick red dust.
2. Chandrikadya- Shining.
3. Ati rechana- highly purgative.
4. Saurashtra deshe utpanna- found in Saurastra.

Test for Kampillaka

- When it is dropped over the water surface, it floats on the water surface.
- It produces yellow lining on white paper when rubbed with the finger tip.
- It is insoluble in cold water, slightly soluble in hot water and completely soluble in alcohol and ether.
- It produces sparkling when dropped over the fire.

Shodhana

To separate the physical impurities or adulterants like brick powder, Kampillaka is poured over the water in the vessel. By this, brick powder or other impurities get settled down in water and pure Kampillaka floats over the water which can be collected, dried and stored.

Probable Physico-chemical changes during above processing

Shodhana method for Kampillaka is Nimajjana (dipping) in the water. Water is used as a Shodhana dravya to reduce the impurities in Kampillaka. The reason behind the Shodhana of Kampillaka is to remove the physical impurities from the raw Kampillaka or it may be Ishtika Churna (brick powder) which is adulterated by the vendor or the source from where the drug was procured. As the Kampillaka is fine and light, it remains on the surface of the water and physical impurities settles down. The process of separation happens to make the Kampillaka devoid of its physical impurities.

Properties and Therapeutic Uses

पित्तव्रणाध्मानविबन्धहारी: श्लेष्मोदरार्तिकृमिगुल्महारी। मूलामशोफज्वरशूलहारी कम्पिल्लको रेच्यगदापहारी।।
(R.R.S.3/123)

Rasa	Katu, Kinchit Amlarasa
Guna	Laghu
Veerya	Ushna
Doshaghnata	Kaphapitta hara
Karma	Rechaka, Vranaropaka, Vidbhedaka, Raktapittaghna, Krimighna, Amapachaka, Shoolanashaka, Twakdoshahara
Prayoga	Dooshita pitta, Vrana, Admana, Vibandha, Malamootra avarodha, Krimi, Dooshita kapha, Udara roga, Krimiroga, Gulma, Arshas, Shotha, Amadosha, Jwara, Shoola, Udarashtha Krimi

Dose

Therapeutic dose: 4-6 Ratthi (500 - 750 mg).

For Rechana: 3-6 Masha (3-6 gms).

Anupana

Madhu, Ushnajala, Ghrita, Taila, Takra, Dadhi.

Important Formulations

1. Kampillaka malahara
2. Krimighatini gutika
3. Triphaladi ghrta
4. Kasisadi ghrta
5. Kushtadya taila
6. Potaladi churna
7. Shyamadi churna
8. Vidangadi churna
9. Bindu ghrta
10. Kanakaksheera taila

Research Updates

1. Shradha, V Joshi et al, **Authentication of Kampillaka (Mallotus philippinensis): An Important Drug of Ayurveda (Indian Traditional Medicine).** The Internet Journal of Alternative Medicine. 2006 Volume 5 Number 1.

HPLC analysis of the samples revealed wide-variability in their phenolic acid content. Maximal amount of phenolic acids was detected in Dehradun sample. A comparative analysis between immature and mature samples showed increase in cinnamic acid and gallic acid content in the later. M. philippinensis is a well known anthelmintic drug. Cinnamic acid has anthelmintic property. Cinnamic acid was maximal in Dehradun sample followed by the sample mixed with jaggery. Rest of the samples had either minimal or absence of cinnamic acid indicating genuinity of the sample of Dehradun. Ferulic and salicylic acids are also found in Dehradun sample which may contribute to the anthelmintic action of M. philippinensis in infectious or nonhealing wounds.

2. Dr. Sumedh Wasnik et al, **Clinicle Trial on the Efficacy of Use of Kampillaka Taila in the Management of Parikartika,** EIPRMJ, Vol 12, Issue 2, July-December, 2023

   This study reveals that Kampillaka Taila is equally effective as Nifedipine and lignocaine Ointment in management of Parikartika for said duration but in case of Healing criteria of Vrana or Ulcer of Parikartika and gudagata srava, Kampillaka Taila, is found more effective than Nifedipine and lignocaine Ointment.

3. Dr. Arathi Devaraj, **Efficacy of Aqueous extract of Kampillaka (Mallotus Philippensis) against pathogenic Bacteria from Dushtavrana (Non-Healing Ulcer)** IJRD, Volume: 8; Issue: 7; July 2023

   In the current study, the aqueous extract of Kampillaka (Mallottus philippensis) against pathogenic bacteria is evaluated in pus samples of subjects diagnosed with Dushtavrana by culture and sensitivity. With the current study it is evident that the mean zone of inhibition of aqueous extract of Kampillaka possess antimicrobial action against Staphylococcus spp., Pseudomonas spp. and E.coli. Further it is also obvious that as the concentration of aqueous extract of Kampillaka increases, the zone of inhibition also increases.

Navasadara (Ammonium Chloride)

Navasadara is one among the Sadharana rasa. It is one of the mineral drug which is kshara (Alkaline) in nature. It is also called as Chullika lavana and included under shat lavana varga.

Synonyms

नवसारो नव्यसारस्तथैव नवसादरः। नृसादरो नृसारश्च नरसारश्च कीर्तितः।।
किट्टक्षारो निगदितस्तथैव नरसादरः। चूलिकालवणं ख्यातं चुल्लिकालवणञ्च तत्।। (R.T.14/1-2)

Navasara	Navyasara	Navasadara	Nrusadara	Nrusara
Narasara	Kittakshara	Narasadara	Choolika lavana	Chullika lavana

Vernacular Names

Sanskrit - Navasadara
English - Ammonium salt
Hindi - Nausadar
Kannada - Navasadara

Different Opinions About Navasadara

1. According to R.R.S.,

   करीरपीलुकाष्ठेषु पच्यमानेषु चोद्भवः। क्षारोऽसौ नवसारः स्याच्चुल्लिका लवणाभिधः।। (R.R.S.3/127-28)

Navasadara or Chullika kshara is a kshara, obtained by burning karira and pilu wood. It is the pale saltish thing which is sometimes found deposited on burnt brick.

2. According to R.J.N.,

   मनुष्योष्ट्रशूकराणां विष्टाभस्मजमेव तत्। तद्भस्म वाससा गालितं शनैः।।
   वह्निना शोषोयेत् प्राज्ञः शेषः स्यात् नवसारकः।

   The stool of man, camel, hog etc is to be dissolved with water and filtered through a piece of cloth slowly and then dried up by means of heat, the product obtained is Navasara.

3. According to A. P.(2/339), Navasara is residue bhasma obtained by the stool of man, camel, hog etc., after burning. It has kshara guna.
4. R.D. 6th chp. quotes same description as mentioned in R.R.S.
5. According to Damodar Joshi, In Europe it is obtained from the man's urine, hence it is called Narasara. It occurs in Italy and obtained from the volcanic mountains of Sisali.
6. In Rasa Tarangini, Navasadara is mentioned under kshara varga.

Minerological Identification

Properties

Chemical composition	NH_4Cl
Colour	Colorless, White sometimes yellow to brown
Luster	Vitreous
Crystal habit	Cubic, octahedral and dodecahedral
Cleavage	Poor
Specific Gravity	1.53
Diaphaneity	Opaque
Hardness (Moh's Scale)	1-2
Fracture	Conchoidal to earthy
Streak	White

Sources and Occurrence

NH_4Cl occurs naturally in volcanic regions, forming on volcanic rocks near fume releasing vents. The crystals deposited directly from the gaseous state, and tend to be short lived, as they dissolve easily in water. Artificial NH_4Cl prepared by reacting NH_3 with hydrogen chloride.

$$NH_3 + HCl = NH_4Cl$$

Types

According to Gulraj Sharma, commentator of A.P., there are two types of Navasadara:

1. Kritrima 2. Akritrima

Grahya Lakshana/Swaroopa

इष्टिकादहने जातं पाण्डुरं लवणं लघु। (R.R.S.3/128)

Characteristic features of Navasadara are:

1. Ishtika dahane jatam- Obtained by burning bricks.
2. Pandura lavana- Yellowish white coloured salt.
3. Laghu - light.

Shodhana

I Method

नवसारन्तु सलिले त्रिगुणे द्रावयेद्भिषक्। वस्त्रपूतं ततः कृत्वा भाजने स्थापयेत्ततः।।
चूल्लिकायां निधायाथ पचेत्तीव्राग्निना भृशम्। जले शुष्के तलस्थञ्च नृसारं विमलं हरेत्। (R.T.14/3-4)

1 part of Navasara has to be added with 3 parts of water and dissolve it by continuous stirring. Then the solution has to be filtered through the cloth to the vessel and keep the vessel over stove to heat it in teevragni. After drying of the water content, the Nrusara left at the bottom of the vessel is the shuddha Navasara, which is devoid of any impurities.

Note: Heating should not be continued till the complete evaporation of water to avoid charring. Vessel should be taken off from heating when still little watery part is left and dried in sun to get dry white powder.

S.No.	Drugs used	Method of Shodhana	Reference
1	1 part Navasadara + 3 parts water	Dissolved, filtered through cloth and heated till the evaporation of water	R.T. 14/3-4
2	Only Navasadara	Sublimation in Damaru yantra	

Satwapatana

विमलं कठिनीचूर्णे तोलकत्रितयोन्मितम्। विशुद्धं नवसारञ्च चतुस्तोलकसंमितम्।।
खल्वे सम्पेष्य यन्त्रे तु पचेड्डमरुकाभिधे। नृसारसत्वं विशदमूर्ध्वलग्नं समाहरेत्।। (R.T.14/20-21)

3 tolas (36 gms) of shuddha khatika churna and 4 tolas (48 gms) of shuddha Navasadara are mixed and triturated to form uniform mixture. Then the mixture is confined in damaru yantra and heated for 1 day. By this, the Navasadara satwa get collected at the base of the upper pot.

Probable Physico-chemical changes during above processing

Navasadara shodhana helps in removal of foreign material (Physical impurities) present in it. As these impurities are embedded inside the Navasadara, the drug is powdered and dissolved. As Ammonium chloride is soluble in water, it dissolves completely and impurities will remain insoluble. While filtering through cloth, these physical impurities are retained over the cloth and can be removed. Later dissolved Navasadara can be procured back by evaporating the water by heating. After shodhana, crystalline Navasadara will become amorphous and free from impurities.

Properties bnd Therapeutic Uses

Rasa	Amla, Lavana, Kshara
Guna	Snigdha, Sheeta
Veerya	Sheeta
Doshaghnata	Tridosha hara
Karma	Jataragni deeptikara, Saraka, Bhuktamamsa pachaka, Vrschika vishanashaka, Hrdroga nashaka, Netrya, Kushtaghna, Shothahara, Samasta dhatu sandravaka, Lohadravana, Rasendra jarana
Prayoga	Gulma, Pliharoga, Mandagni, Admana, Mukhashosha, Jwara, Shirashoola, Arbuda, Sthanaroga, Raktapitta, Kasa, Bhagnaroga, Yoni vyapat, Samasta roga

Dose

द्विगुञ्जतश्चाष्टगुञ्जमितं तु नवसादरम्। प्राणचार्यः प्रयुञ्जीत बलकालाद्यपेक्षया।। (R.T.14/8)

With due consideration of bala, kala and other factors, Navasadara has to be administered at the dose of 2-8 Ratti (250-1000 mg).

Important Formulations

1. Shweta Parpati
2. Shankha Drava
3. Vrschika damshahara Lepa
4. Rajavallabha Rasa
5. Rohitakadya Churna
6. Dravaka Rasa

Research Updates

1. Krishna Kumar K, et al,**Effect of Shwethaparpati in Uncomplicated Lower Urinary Tract Staphylococcal Infection - A case report.** Annals of the Romanian Society for Cell Biology, 1225-1232.

The patient was administered the drug Shwetaparpati for the duration of fourteen days. She was assessed before, after and on follow-up treatment for improvement using subjective and objective assessment criteria. ICD 10 CM-N39.0 is used for the selection and assessment. Initially, symptoms of increased frequency and urgency,

Dysuria, abdominal pain back pain, burning micturition, tiredness, bacteriuria, pyuria, and hematuria were found reduced. On the follow-up it was observed that the bacteria disappeared completely.

2. Dr. Nagaratna, et al., **Clinical study to evaluate the effectiveness of Narikela Lavana, Navasadara Yuktha Yavakshara in comparision with Surya and Navasadara Paneeya Kshara in the management of Cholelithiasis,** JAIMS, 5(05), 39-45

The combination of Narikela Lavana, Navasadara Yuktha Yava Kshara shown significant result in all subjective and objective criteria, when compared to Surya and Navasadara Paneeya Kshara in Cholelithiasis.

Hingula (Red Cinnabar)

Hingula is grouped under Sadharana rasa in many of the Rasa texts. It is the compound of Parada and Gandhaka and a chief source of Parada since ancient times. So, few Rasa texts like Rasarnava, Rasa hridaya tantra and Rasa kamadhenu might have mentioned Hingula as Maharasa. In ancient times, parada was obtained from Hingula through patana process using yantras like damaru yantra. Hingulottha Parada was considered to be the best and its quality is like ashta samskarita parada.

Synonyms

हिङ्गुलो हिङ्गुलश्चैव हिङ्गूलं चेङ्गुलाह्वयम्। म्लेच्छं रक्तं सुरङ्गञ्च चित्राङ्गं चूर्णपारदम्।।
रसोद्भवो रसस्थानं रञ्जनं कपिशीर्षकम्। रक्तकायो हंसपादो दरदञ्च प्रकीर्तितम्।। (R.T.9/1-2)

Hingulo	Hingula	Hingoola	Mlechcha	Rakta
Suranga	Chitranga	Churnaparada	Rasodbhava	Rasasthana
Ranjana	Kapisheershaka	Raktakaya	Hamsapada	Darada

Vernacular Names

Sanskrit - Hingula
English - Cinnabar
Hindi - Singaraph
Kannada - Ingalika

Minerological Identification

Cinnabar is the chief ore of Mercury contains 80-85% of Mercury. This is a red colored ore, divides itself into pointed needle like pieces. It is very soft and when ground it becomes deep red colour powder.

Properties

Chemical composition	HgS
Colour	Bright scarlet or cinnamon red to brick red

Probable Physico-chemical changes during above processing

Navasadara shodhana helps in removal of foreign material (Physical impurities) present in it. As these impurities are embedded inside the Navasadara, the drug is powdered and dissolved. As Ammonium chloride is soluble in water, it dissolves completely and impurities will remain insoluble. While filtering through cloth, these physical impurities are retained over the cloth and can be removed. Later dissolved Navasadara can be procured back by evaporating the water by heating. After shodhana, crystalline Navasadara will become amorphous and free from impurities.

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Properties

Chemical composition	HgS
Colour	Bright scarlet or cinnamon red to brick red

Luster	Adamantine to submetallic
Crystal system	Trigonal
Cleavage	Prismatic, perfect
Specific Gravity	8.176
Diaphaneity	Translucent to transparent
Hardness (Moh's Scale)	2 - 2.5
Fracture	Uneven to Subconchoidal
Streak	Scarlet to Reddish brown

Types

हिङ्गुलः शुकतुण्डाख्यो हंसपाकस्तथाऽपरः। प्रथमोऽल्पगुणस्तत्र चर्मरिः स निगद्यते।। (R.R.S.3/139)
प्रथमः खनिजोऽन्यस्तु कृत्रिमो हिङ्गुलो मतः। खनिजः खनितो जातः कृत्रिमो रसगन्धजः।। (R.T.9/4)

According to R.R.S., Hingula is of 2 types :-

1. **Shukatunda**- It is of parrot beak colour. It is also called as Charmara and this type is less potent compared to other variety.
2. **Hamsapada**- It is of the colour of Pravala and consist of white lines over it. This variety is considered to be more potent compared to other one.

According to R.T., it is of 2 types depending upon the Occurrence:

1. **Khanija**- Naturally available in mines.
2. **Kritrima**- Artificially prepared using Mercury and Sulphur.

According to A.P., Hingula is of 3 types depending upon the colour and properties:

1. **Charmara** : Krishna, Rakta Varna- least potent.
2. **Shukatunda** : Peeta Varna- more potent.
3. **Hamsa Pada** : Japa Kusuma (red) Varna- most potent.

Grahya Lakshana

जपाकुसुमवर्णाभः पेषणे सुमनोहरः। महोज्ज्वलो भारपूर्णो हिङ्गुलः श्रेष्ठ इष्यते।। (R.T.9/3)

Characteristics of genuine Hingula are:

1. **Japakusuma Varnabha**- Resembles colour of petals of red hibiscus flower.
2. **Peshane Sumanoharaha**- Its colour becomes beautiful When grounded.
3. **Mahojwala**- Very bright and lustourous.
4. **Bharapurna**- Heavy in weight.

Also, Shweta Rekha - Having white or silvery streaks and Pravalabha - Resembles like that of *Pravala.*

Ashuddha, Apakwa and Avidhee Sevanajanya Dosha of Hingula

अशुद्धो हिङ्गुलो मोहं प्रमेहं चित्तविभ्रमम्। आन्ध्यं क्लमं तथा क्षीण्यं कुर्यात्तस्माद्विशोधयेत्।। (R.T.9/11)

If ashuddha Hingula is consumed, it causes

1. Moha (Delusion)
2. Prameha (Diabetes and other urinary tract disorder)
3. Chittavibhrama (Delusion)
4. Andhyata (Blindness)
5. Klama (Fatigue)
6. Ksheena (Emaciation)

Therefore, shodhana of Hingula should be done.

Shodhana

I Method

सप्तकृत्वाऽऽर्द्रकद्रावैर्लकुचस्याम्बुनाऽथवा। शोषितो भावयित्वाऽथ निर्दोषो जायेत खलु।। (R.R.S.3/142)

Hingula get purified by subjecting it to Bhavana with Ardraka swarasa or Lakucha rasa for 7 times and drying it.

II Method

निम्बूकस्वरसेनेह हिङ्गुलं श्लेक्ष्णचूर्णितम्। विभावयेत्सप्तवारं क्षालयेद्बहुशोऽम्भसा।।

ततः संशोषयेद् धर्मे रसतन्त्रविधानवित्। एवं विशोधितं रक्तं वीतशङ्कः प्रयोजयेत्।। (R.T.9/16-17)

In order to purify Hingula, it has to be triturated into fine powder and subject it to bhavana with Nimbuka swarasa for 7 times and washed with water. Later it is dried in sun and stored after which it can be used for different therapeutic purposes without any doubt about its purity.

S.No.	Drugs used	Method of Shodhana	Reference
1	Ardraka swarasa or Lakucha swarasa	7 Bhavana	R.R.S.3/142
2	Meshaksheera or any amlavarga drugs	Several Bhavana	R.R.S.3/143
3	Nimbu swarasa	7 Bhavana	R.T.9/16-17 A.P. 2/74

Marana

I Method

Hingula is used for the preparation of yogas after shodhana. Generally marana is not advised for Hingula. However there is reference of marana procedure in Ayurveda prakasha. Hingula is wrapped with the cloth and placed inside neela kanda, then covered with the mud paste around it. It is allowed for drying after which subjected to puta

with 10 vanopalas. Similarly, 100 such putas are given by placing it inside neela kanda, then given 100 putas by placing inside vanavarataka and kept in mandara phala and given hundred putas, then by keeping in indravaruni phala, subjected to 100 putas and finally placed it in amlavetasa phala and subjected for 100 putas. At the end Hingula attains intense red colour which is termed as Hingula bhasma.

Probable Physico-chemical changes during above processing

Hingula shodhana is done by Bhavana process. This technique minimises or removes the toxic effect of the drug, converts hard material into soft and impregnates the organic qualities of bhavana dravya into the Hingula. After shodhana, there will be reduction in its lustre, hardness is reduced and change in colour of Hingula. This is due to the presence of acid content in Lakoochaphala swarasa, Nimbu swarasa or Amla dravas. The acid content reacts with metals, does mass breaking and disintegration and reduces its lustre and brightness. Ethanolic extraction of lakoocha contains antioxidants and polyphenolic compounds, especially tannins and flavonoids. Likewise the other herbal drugs contains certain phytochemicals which will be imbibed into the Hingula.

Properties and Therapeutic Uses

श्वेतरेखः प्रवालाभो हंसपादः स ईरितः। हिङ्गुलः सर्वदोषघ्नी दीपनोऽतिरसायनः।।
सर्वरोगहरो वृष्यो जारणायातिशस्यते। एतस्मादाहृतः सूतो जीर्णगन्धसमो गुणैः।। (R.R.S.3/140-141)

Rasa	Tikta, Kashaya, Katu
Guna	Snigdha, Ushna
Veerya	Ushna
Vipaka	Katu
Doshaghnata	Tridoshahara
Karma	Deepana, Pachana, Rasayana, Vrushya, Balya, Vajikara, Santatikara, Medhakanthivardaka, Hrudutsahakara, Netrya.
Prayoga	Prameha, Kushta, Jwara, Mandagni, Hrdroga, Aruchi, Amlapitta, Hrullasa, Pliharoga, Amavata, Gara Visha. Useful in Dhatu marana and Jarana samskara

Dose

½ - 1 Ratti (62-125 mg)

Anupana

Maricha, Guda, Pippali, Guduchi Swarasa, Madhu.

Satwapatana

दरदः पातनायन्त्री पातितश्च जलाशये। ततसत्त्वं सूतसंकाशं जायतेनात्र संशयः।। (R.R.S.3/144)

Shodhita Hingula is smeared in the upper part of Adhapatana yantra, water is filled in lower vessel. This apparatus is placed in the earth. Heat is given to the upper vessel, then we will get parada samana satwa in lower vessel.

Management of Ashuddha, Apakwa and Avidhee Sevanajanya Dosha of Hingula

Shuddha Gandhaka 3-6 gms with Milk is given twice a day until the doshas caused due to intake of Ashuddha Hingula subsides.

Important Formulations

1. Ananda Bhairava Rasa
2. Kanaka Sundara Rasa
3. Jwara Murari Rasa
4. Vasantha malati Rasa
5. Darada Vati
6. Tribhuvana Kirti Rasa
7. Kasturi Bhairava Rasa
8. Hinguleshwara Rasa
9. Ratna Garbha Pottali Rasa
10. Atisarahari Vati

Research Updates

1. Mehta NJ et.al., **Standard operating procedures of Hingulottha Parada,** IJAM, 2010, 2 (1), 27-36

   Hingulottha Parada is extracted by Urdhva Patana (upward sublimation), Adhah Patana (down wards sublimation) and Tiryanka Patana (transverse sublimation) method. Among them Urdhva Patana (upward sublimation) by Nada Yantra is very convenient to procure approx 73.00% Parada from the Hingula.

2. Dr. Dinesh Gupta, **Pharmaceutico- Analytical Study of Hinguleshwara Rasa** Rasamruta, 4:5, June 2012

   Physico-chemical analytical results of Hinguleshwara rasa show 21.73% Hg and 6.44% Sulphur. The pH of 1% solution was found to be 6.58 and the disintegration time was 16 minutes. It can be concluded that the pharmaceutical processing of Hinguleshwara Rasa is easy and very economical.

Swarna (Gold)

Synonyms

स्वर्णं सुवर्णे द्रविणं हिरण्यं कल्याणकं काञ्चनमग्निवर्णम्। मनोहरं हेम च भूषणार्हं तथाग्निबीजै कनकञ्च कौन्तम्। भृङ्गारमाङ्गल्यकजाम्बवानि जाम्बूनदं धर्म च जातरूपम्। चाम्पेयकं लोहवरञ्च रुक्मं चामीकरं हाटकसंज्ञमुक्तम्।।

(R.T.15/9-10)

Swarnam	Suvarnam	Dravinam	Hiranyam	Kalyanakam
Kanchanam	Agnivarnam	Manoharam	Hema	Bhushanahram
Agnibeejam	Kanaka	Kauntam	Bhringara	Mangalyaka

Jambava	Jambunada	Bharma	Jatarupa	Champeyakam
Lohavara	Rukma	Chamikara	Hataka	

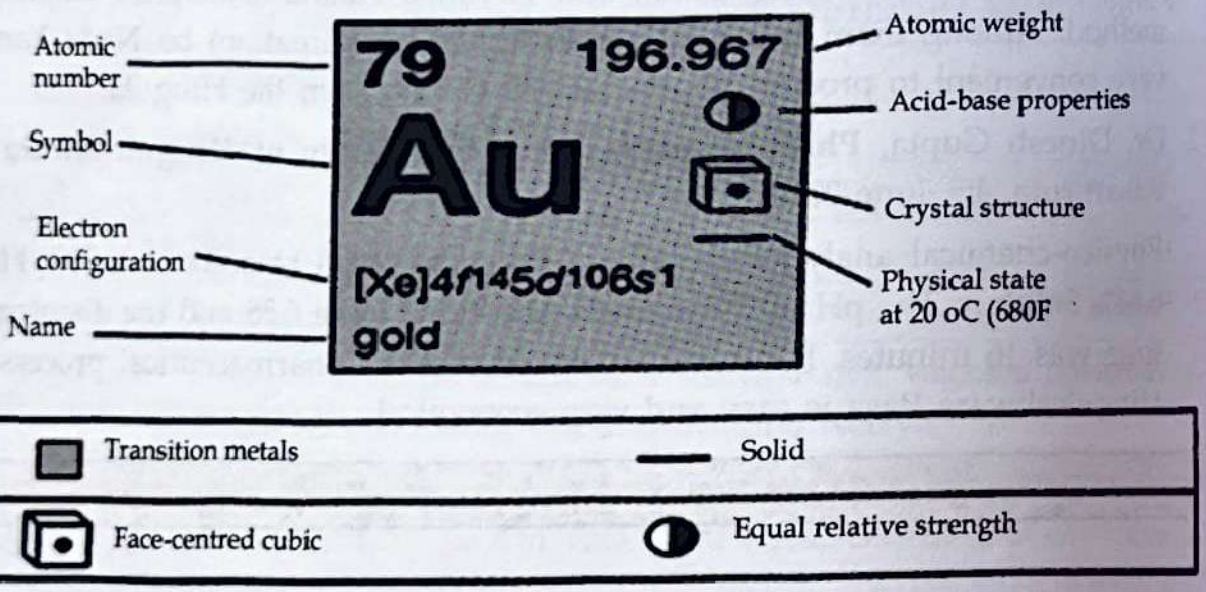
Vernacular Names

Sanskrit - Swarnam
English - Gold
Hindi - Sona
Kannada - Chinna
Latin - Aurum
Symbol - Au

Minerological Identification

Gold is one of the noble metals. Noble metals are a group of metals which do not corrode over time under normal conditions. Most natural gold is actually impure. It generally contains small but notable traces of other metals including silver, copper, mercury and palladium. The purity of gold is measured in carats with 100% pure gold being 24 carats.

Gold



Identification Properties

Chemical symbol	Au
Colour	Golden yellow to brass yellow
Cleavage	None
Crystal habit	Isometric- hexollahedral
Specific Gravity	15.5-19.3

CHAPTER EIGHT

Transparency	Opaque, except when extremely thin
Hardness (Moh's Scale)	2.5-3
Luster	Metallic
Fracture	Hackly
Streak	Golden yellow
Melting point	1064°C
Boiling point	2700°C

Sources and Occurrence

Gold is available usually in combined form. In few places, its available in native form, which is known as Native Gold. Gold is widespread in low concentrations in all igneous rocks. It is found in large quantity in U.S.A., South Africa, U.S.S.R., Canada, Japan, Australia, Mexico, China and other places. In India, it is available in Bihar, Assam, Madhya Pradesh, Kolar of Karnataka and Ananthpur of Andra Pradesh, In combined form, its available in the form of different ores like:

1. Calaverite ($Au Te_2$)
2. Sylvenite $(Au, Ag) Te_2$
3. Kalgoorlite
4. Sulphide ore
5. Auriferous pyrite ore

Types

प्राकृतं सहजं वह्निसंभूतं खनिसंभवम्। रसेन्द्रवेधसंजातं स्वर्णं पञ्चविधं स्मृतम्। (R.R.S.5/2)

The five types of Swarna are:

1. Prakruta
2. Sahaja
3. Vahnisambuta
4. Khanija
5. Rasendravedaja

Grahya Lakshana

बालारुणारुणमलं ज्वलनप्रतप्तं। शाणोपले घुसृणचूर्णसमानवर्णम्।।
नाराचिकाधृतमलं गुरुतामुपेयात्। स्निग्धं तदेव कनकं कथितं जु जात्यम्।। (R.T. 15/11-12)

Gold is said to be best if it possess the below qualities:

1. Balarunarunamalam jwalana prataptam- it shines like that of morning sun with the colour of aruna (Red), when heated.
2. Shaanopale ghusruna churna samana varnam naaraachika ghrutamalam- when it is rubbed over Shanopala (scratch stone), it leaves the lines of kesara varnam.
3. Gurutamupeyath- it is heavier comparatively.
4. Snigdham- unctous.

Agrahya Lakshana

कठिनं लघु रूक्षञ्च कर्ष च्छेदेऽनले सितम्। तारताम्रसमायुक्तं स्वर्णं हेयं स्मृतं बुधैः।। (R.T. 15/13)

Gold is said to be of inferior quality if it possess the below qualities:

1. Katina- hard.
2. Laghu- light.
3. Rooksha- rough.
4. Kashe chedhe anale sitam- if it displays white colour on rubbing or cutting or on heating.
5. Taratamra samayuktam- admixed with silver or copper.

Ashuddha, Apakwa and Avidhee Sevanajanya Dosha

यस्मादशोधितं स्वर्णं हन्ति बुद्धिबलादिकम्। करोति च बहून् रोगान् तस्मात्स्वर्णं विशोधयेत्।। (R.T.15/14)

Swarna should be purified before internal administration. Otherwise it will results in-

1. Buddhi nasha
2. Bala nasha
3. Many rogas

Shodhana

Swarna should subjected to samanya and Vishesha shodhana.

Samanya Shodhana

'तैले तक्रे गवां मूत्रे ह्यारनाले कुलत्थजे।
क्रमाविषेचयेत्तप्तं द्रावे द्रावे तु सप्तधा। स्वर्णादिलोहपत्राणां शुद्धिरेषा प्रशस्यते'।। (RRS 5/13)

Swarna should be heated up to red hot on the flame and dipped into Tilataila, Takra Gomutra, Aranala, Kulattha Kwatha for 7 times in each liquid media successively.

Vishesha Shodhana

I Method

विततानि विशालानि कर्षैकप्रमितानि तु। सूचीवेध्यानि पत्राणि सुवर्णस्य समाहरेत्।।
ततः खल्वम्लपिष्टेन मृत्तिकापञ्चकेन वै। तानि पत्राणि संलिप्य कपोताख्यपुटे पुटेत्।।
स्वर्णं सप्तपुटैरेव शुद्धिमायात्यनुत्तमाम्। (R.T.15/15-17)

Thin foils of gold (suchivedhi patra) is made and the mixture prepared with Panchamrittika triturated with amla rasa (lemon juice) is applied thickly over the Swarna patra. These patras are confined in sharava samputa and subjected to kapota puta. This makes the swarna shuddha.

II Method

मृत्तिकामातुलुङ्गाम्लैर्भावितं पञ्चवासरम्। मृद्भमलवणाद्धेम शोधयेत् पुटयेत् ततः।। (R.S.S.1/248)

Swarna is triturated with panchamrittika and Matulunga swarasa for 5 days. Then Swarna patras are smeared with the paste of Panchamrittika, Bhasma of wood

and Saindava lavana, dried and confined to sharava samputa. This sharava samputa is subjected to Kukkuta puta and this will purify the Swarna.

S.No.	Drugs used	Method of Shodhana	Reference
1	Panchamrittika and Amla rasa	Lepa over patras, dried and Kapota puta	R.T. 15/15-17
2	Saindava lavana, Vanyopala bhasma	Lepa over patras, dried and Kukkuta puta	R.T. 15/18-19
3	Panchamrittika and Matulunga rasa, bhasma of wood, Saindava lavana,	Lepa over patras, dried and subjected to puta	R.S.S. 1/248

Marana

I Method

कृत्वा कण्टकवेध्यानि स्वर्णपत्राणि लेपयेत्।। लुङ्गाम्बुभस्मसूतेन म्रियते दशभिः पुटैः।। (RRS 5/15)

Purified thin foils of Swarna patras are smeared with the paste of Rasa bhasma (Rasa sindura) and lemon juice, dried and enclosed the patras in sharava samputa. Later it is subjected to Kukkuta puta. The entire procedure is repeated for 10 times so that the 10 putas will make the Swarna bhasma.

II Method

द्रुते विनिक्षिपेत्स्वर्णे लोहमानं मृतं रसम्।
विचूर्ण्य लुङ्गतोयेन दरदेन समन्वितम्।।
जायते कुङ्कुमच्छायं स्वर्णं द्वादशभिः पुटैः।। (RRS 5/16-17)

Shuddha Swarna is heated in Iron crucible till it melts, then Rasa bhasma (Rasa sindura) is added to it and mixed well. This mixture is taken in khalwa yantra and equal quantity of Hingula is added. This is triturated well by adding required amount of Nimbu rasa and chakrikas are prepared. These chakrikas are enclosed in sharava samputa after drying and subjected to Kukkuta puta. The entire procedure is repeated for 12 times to yield the Swarna bhasma which is of Kumkuma (Kesara) varna.

S.No	Drugs used	No. and Type of Puta	Reference
1	Rasa bhasma and Nimbu rasa	10 Kukkuta puta	RRS 5/15
2	Rasa bhasma, Hingula and Nimbu rasa	12 Kukkuta puta	RRS 5/16-17
3	Shuddha Parada, Shuddha Hingula, Shuddha Gandaka, Shuddha Manashila, Shuddha Navasadara and Nimbu rasa	Laghu puta till the bhasma becomes nischandra	R.T. 15/51-52

4	Shuddha Parada, Nimbu rasa, Shuddha Manashila, Rasasindura, Swarna-makshika bhasma and Arka ksheera	Laghu puta till the bhasma becomes nischandra	R.T. 15/53-58
5	Shuddha Parada, Shuddha Gandaka and Nimbu rasa	14 Laghu puta	R.T. 15/59-61

Probable Physico-chemical changes during above processing

Samanya shodhana of Dhatus are done by Nirvapa method. Nirvapa is applied to metals & minerals having melting point more than 500°C. Heating to red hot and dipping in to liquids of variable pH makes metals and minerals brittle, also neutralises their toxic character.

During red hot, impurities/metal react with atmospheric oxygen forming compounds on surface and generally expansibility of compounds are less than metals which leads to separation of impurities. After this, immediate cooling in liquid media leads to decrease in tension and increase in compression force, so media immediately penetrates inside and soluble impurities get dissolved. During instant cooling, it may be possible that recrystallization occurs along with reformation of grain boundaries and each grain is surrounded by the molecules of liquid media imposing its properties on that purified metals. The insoluble atoms may not be able to migrate out of the solution. This is called "diffusion less transformation" and crystal matrix changes to its low temperature arrangement, the atoms of the solute become trapped within the lattice. The trapped atoms prevent the crystal matrix from completely changing into its low temperature allotrope, creating shearing stresses within the lattice, which may be similar to martensitic transformations. Repetition of these process causes disruption in equilibrium, leads to increased brittleness, reduction in hardness and finally particle size get reduced.

This process prepares the metals for further pharmaceutical procedures like marana and others. Different types of putas are used for the incineration of different metals, based on the heat tolerance capacity of particular metal. Selection of suitable puta for conversion of metal in to ash form is desirable to provide different grades of temperature.

Properties and Therapeutic Uses

स्निग्धं मेध्यं विषगदहरं बृंहणं वृष्यमग्र्यं यक्षोन्मादप्रशमनपरं देहरोगप्रमाथि।।
मेधाबुद्धिस्मृतिसुखकरं सर्वदोषामयघ्नं रूच्यं दीप्तिप्रशमितरूजं स्वादुपाकं सुवर्णम्।। (R.R.S.6/10)

मृतसुवर्णस्य गुणाः।

Rasa	Madhura, Kashaya, Tikta
Guna	Sheeta, Guru, Snigdha, Picchila
Veerya	Sheeta

Vipaka	Madhura
Doshaghnata	Tridoshahara
Karma	Medhya, Vishaghna, Brhmana, Vrshya, Hridyam, Netryam, Rasayana, Pumsavanopayogi, Kantikara, Ayushyam, Varnyam, Balyam, Ruchyam, Deepana, Keshyam, Medha-Buddhi-Smrutiprada, Pushtikara, Ojovardhaka, Vayastapaka, Yogavahi
Prayoga	Yakshma, Unmada, Kshaya, Mandagni, Shwasa, Kasa, Aruchi, Grahani, Panduroga, Granthi, Visarpa, Vishagaarodbhava roga

Dose

समारभ्याष्टमाद् भागाद् रक्तिकाया भिषग्वरः। योजयेत्तूर्यभागान्तं मृतं स्वर्णं तु कालवित्।। (R.T.15/81)

1/8th Ratti- 1/4th Ratti (15-30 mg)

Shuddha Swarna - Practical Usage

विशुद्धस्वर्णस्य प्रयोगक्रमः। विशोधितं सुवर्णन्तु रसतन्त्रविचक्षणः।
घृष्ट्वा च मण्डलीकृत्य तत्र तत्र प्रयोजयेत्।। (R.T. 15/27)

Purified gold can be used in following way:

1. Ghrusta Swarana- By rubbing over rubbing stone.
2. Swarna Mandala/Vark- By preparing thin foils.
3. Swarna Lavana- Gold Chloride preparation.

Anupana

Madhu, Ghrita, Trikatu churna.

Pathya-apathya

Apathya- Bilwa phala.

Important Formulations

1. Swarna parpati
2. Hemagarbha pottali
3. Siddha makaradwaja
4. Yogendra Rasa
5. Bruhat vatachintamani Rasa
6. Swasakasa chintamani Rasa
7. Kanchanabhra Rasa
8. Trailokya chintamani Rasa
9. Kasturibhairava Rasa
10. Swarnamalini vasanta Rasa

Research Updates

1. Paul W, Sharma CP. **Blood compatibility studies of Swarna bhasma (gold bhasma), an Ayurvedic drug.** Int J Ayurveda Res. 2011 Jan;2(1):14-22

Swarna bhasma, a therapeutic form of gold metal of nano-sized particles found to be with a crystallite size of 28–35 nm and was 90% pure gold as visible from

X-ray diffraction and elemental analysis. They had a low negative zeta potential in a physiological pH. The *Swarna bhasma* preparations did not induce any blood cell aggregation or any protein adsorption. It has been demonstrated that uptake of gold nanoparticles occurred in the small intestine by absorption through single, degrading enterocytes in the process of being extruded from a villus and gold nanoparticles typically less than 58 nm in size reaching various organs through blood, which suggests the importance of the blood compatibility studies for the standardization of *bhasma* preparations. Since gold in the *Swarna bhasma* is approximately 28–35 nm in size, it can reach the affected site on oral administration via intestinal absorption and possibly can release Au(I) ions in a sustained manner required for therapeutic action.

2. Pareek and Ojha, **EVIDENCE BASED STUDY OF EFFECT OF SWARNA YOGA (GOLD FORMULATIONS) IN CHILDREN: A SYSTEMATIC REVIEW** IJPSR, 2021; Vol. 12(12): 6209-6213.

   Total 7 clinical studies showing safety and efficacy of Ayurvedic herbo-metallic preparations in paediatric disorders such as Chronic tonsillitis, Upper Respiratory Tract Infection (URTI) and healthy children were treated with significant effect in their diseased condition and reducing the frequency of recurrent infections. No any adverse or toxic effect of any of these formulations was noticed. So Gold preparations are found quite safe to use in pediatric disorders with proper dose and vehicle as well as in healthy children.

3. Rana A, Sharma S et al, **Clinical Study on the effect of Swarnamrita prashana (Modified Swarna Prashana) on Immunity [IgG] in Children of 3to 5 years.** J Adv Res Ayur Yoga Unani Sidd Homeo, 2021;8(3&4):1-6.

   The final assessment concluded that Swarnamrita prashana was effective in reducing the recurrent episodes of infection from 6.23 to 4.10 making the difference of 2.13 episodes in RTI and reducing the episodes from 1.033 to 0.63 making the difference of 0.403 episodes in GIT. Swarnamrita prashana also strengthens the immune system of the body that was also supported by laboratory investigation, which showed the improvement in IgG levels in study group. It has also showed accelerated growth, when the mean of the anthropometric values were compared.

4. Bhaskaran JK et al,**Effect of Swarna Bhasma on Memory and Learning in Swiss Albino Mice.** J. res. tradit. med. 2015; 1(1): 23-28.

   The present study was conducted to evaluate the effect of Swarna Bhasma on memory and learning against hyoscine/scopolamine induced amnesia in albino mice. The trial drug showed significant decrease in transfer latency ($p<0.05$) both on 2nd and 3rd day of the study when compared with initial values and the control

group. Swarna Bhasma exhibited significant therapeutic effects on memory and learning in albino mice.

Rajata (Silver)

Synonyms

रजतं रुचिरं रौप्यं तारं सौधञ्च शुभ्रकम्। चन्द्रलोहं चन्द्रहासं रूपकं चन्द्रसंज्ञकम्।। (R.T.16/1)

Rajata	Ruchira	Roupyam	Taaram	Soudham
Shubhraka	Chandraloha	Chandrahasam	Rupaka	Chandra
Rupyam	Sitam	Shweta	Vasuttama	Kaaladhouta
Taara	Roupyaka	Chandraka	Chandra vapu	Taaraka
Chandrakanti	Sitaprabha	Vasushreshta	Mahashubhra	Rupaka

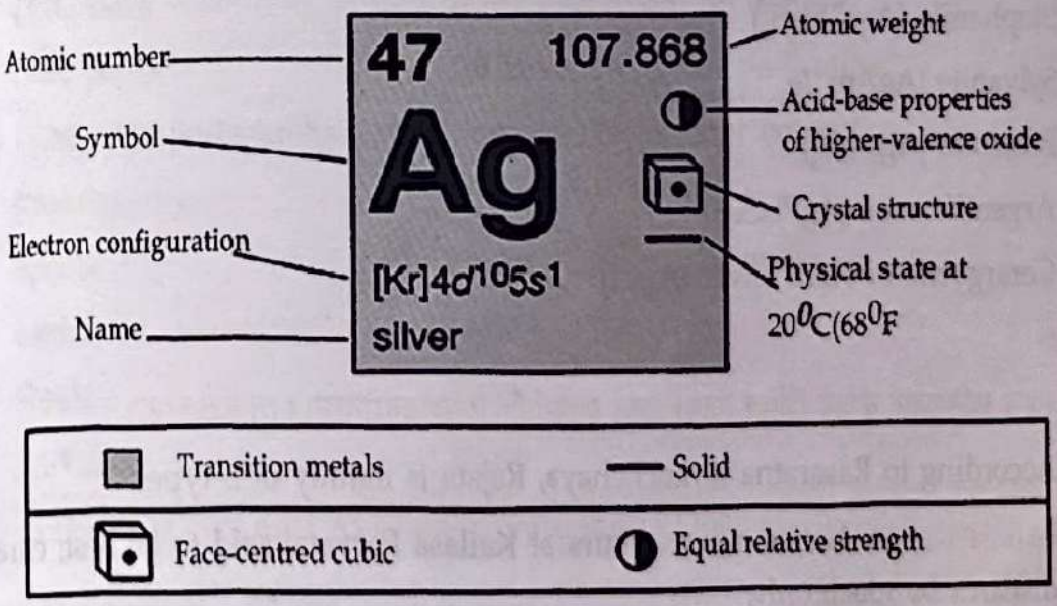
Vernacular Names

Sanskrit - Rajata
English - Silver
Hindi - Chandi
Kannada - Belli
Latin - Argentinum
Symbol - Ag

Minerological Identification

The Latin name of silver is Argentinum which means "shiny" or "white". Pure silver is nearly white, lustrous, soft, very ductile, malleable transition metal. It exhibits the highest electrical conductivity, thermal conductivity, and reflectivity of any metal.

Silver



CHAPTER EIGHT

Identification Properties

Chemical Symbol	Ag
Colour	Silvery White
Luster	Metallic
Crystal habit	Whole individual crystals are extremely rare but if present, usually cubes, dodecahedrons and octahedrons
Cleavage	None
Specific Gravity	10-11
Diaphaneity	Opaque
Hardness (Moh's Scale)	2.5-3
Fracture	Jagged
Streak	Silvery white
Melting point	960.8°C
Boiling point	2212°C

Sources and Occurrence

Native silver is occasionally found in large masses or crystallized in cubes and octahedral. In Mexico, America, USSR, Peru, Australia, Russia Poland, South Africa, South Europe and Canada. In India it is available in Orissa, Middle of India, Madras, Rajasthan etc. In Karnataka, its available in Mysore district.

Important Ores of Silver

- Argentite or silver glance (Ag_2s)
- Pyrargyrite or ruby silver ($Ag_2S.Sb_2s_3$)
- Stumerite or silver copper glance (Ag_2S, Cu_2S)
- Stephanite (Ags, Sb_2S_4)
- Sylvanite (AgAu) Te_2
- Proustite (Ag_3AsS_3)
- Argentiferrous (AgPbCuS)
- Cerargyrite or Horn silver (AgCl)

Types

सहजं खनिसंजातं कृत्रिमं त्रिविधं मतम्। रजतं पूर्वपूर्वं हि स्वगुणैरुत्तरोत्तरम्।। (R.R.S.5/22)

According to Rasaratna samuchchaya, Rajata is mainly of 3 types:

1. Sahaja Rajata- Native silver; occurs at Kailasa Parvata; said to be best; cures all diseases by touch only.

2. **Khanija Rajata-** Ores of silver; occurs at Himalaya Parvata; said to be better; has Rasayana effect.
3. **Kritrima Rajata-** Rasaviddha Silver or Rajata; occurs through mercurial transformation from lower metals; said to be good; cures all sorts of diseases.

According to Rasarnava, there are 2 types of Rajata:-

1. Shukla 2. Tara

According to Bruhat yoga tarangini, 2 types of Rajata are:-

1. Prakruta 2. Kritrima

Grahya Lakshana

घनं स्वच्छं गुरु स्निग्धं दाहे छेदे सितं मृदु। वर्णाढ्यं चन्द्रवत्स्वच्छं दाहे छेदे समप्रभम्।।
शङ्खाभं मसृणं स्फोटरहितं रजतं शुभम् ।। (R.R.S.5/26)

Rajata is said to be best quality if it is having the qualities like-

1. Swaccha	-	Clean.
2. Guru	-	Heavy.
3. Snigdha	-	Unctuous.
5. Dahe Chede Sitam	-	Remains white and clear on heating or cutting it.
6. Mrudu	-	Tender and malleable.
7. Shankabha	-	White as Shankha.
8. Masruna	-	Soft.
9. Sphotarahita	-	Devoid of openings or crack.

Agrahya Lakshanas:

दाहे रक्तं च पीतं च कृष्णं रूक्षं स्फुटं लघु। स्थूलाङ्गं कर्कशाङ्गं च रजतं त्याज्यमष्टधा।। (R.R.S.5/27)

Rajata having below qualities must not be used for medicinal purpose:

1. Dahe rakta	-	Turns Red colour on heating.
2. Dahe peeta	-	Turns yellow colour on heating.
3. Dahe rakta peeta krshna	-	Turns to Black colour on heating.
4. Rooksha	-	Rough.
5. Sphuta	-	Having cracks or openings.
6. Laghu	-	Light.
7. Shtula	-	Thick.
8. Karkasha	-	Hard.

Ashuddha, Apakwa and Avidhee Sevanajanya Dosha

आयुः शुक्रं बलं हन्ति तापविड्बन्धरोगकृत्। अशुद्धं न मृतं तारं शुद्धं मार्यमतो बुधैः।। (R.R.S.5/31)

Rajata Bhasma which is not properly purified and incinerated causes:

1. Ayu nasha
2. Shukranasha
3. Balahani
4. Santapa
5. Vitbandha

Shodhana

Rajata should subjected to samanya and Vishesha shodhana.

Samanya Shodhana

'तैले तक्रे गवां मूत्रे ह्यारनाले कुलत्थजे।
क्रमान्निषेचयेत्तप्तं द्रावे द्रावे तु सप्तधा।
स्वर्णादिलोहपत्राणां शुद्धिरेषा प्रशस्यते'।। (R.R.S 5/13)

Rajata Patras should be heated up to red hot on the flame and dipped into Tilataila, Takra, Gomutra, Aranala, Kulattha Kwatha for 7 times in each liquid media successively.

Vishesha Shodhana

I Method

पत्रीकृतं तु रजतं ज्वलने प्रतप्तं निर्वापयेन्मुनितरोः स्वरसे त्रिवारम्।
इत्थं विशुद्धममलं खलु चन्द्रीलोहं संयोजयेन्मृतिविधौ भिषजां वरेण्यः।। (R.T.16/6)

Rajata Patras are heated to red hot and immersed in Agastya Patra swarasa for 3 times. This will purify the Rajata patras and such patras can be used for the purpose of Marana.

II Method

नागेन टङ्कणेनैव वापितं शुद्धिमृच्छति। तारं त्रिवारं निक्षिप्तं तैले ज्योतिष्मतीभवे।। (R.R.S.5/31)

Equal quantity of Rajata, Naga and Tankana are mixed by melting Rajata and Naga and adding Tankana churna. The mixture is heated till red hot on fire and immediately quenched in Jyotishmati Taila for 3 times. This will purify the Rajata.

S.No.	Drugs used	Method of Shodhana	Reference
1	Agastya patra swarasa	Nirvapa for 3 times	R.T.16/6
2	Naga, Tankana and Jyothishmati taila	Nirvapa for 3 times	R.R.S.5/31 R.T.16/7-9
3	Nimbu swarasa	Nirvapa till Rajata becomes soft	R.T.16/10-12

Marana

I Method

माक्षीकचूर्णलुङ्गाम्लमर्दितं शनैः। त्रिंशद्वारेण तत्तारं भस्मसाज्जायतेराम्।। (R.R.S.5/36)

Shuddha Swarnamakshika powder is triturated with nimbu swarasa to make it a paste and that paste is smeared over the Rajata patras. After drying, these patras

NOT FOR SALE

are confined inside the sharava samputa and subjected to laghu puta. Same procedure repeated for 30 times will yield the rajata bhasma.

II Method

भाव्यं ताप्यं स्नुहीक्षीरैस्तारपत्राणि लेपयेत्। मारयेत्पुटयोगेन निरुत्थं जायते ध्रुवम्।। (R.R.S.5/37)

The paste of Swarnamakshika and Snuhiksheera is smeared over the shuddha Rajata patras and enclosed inside the Sharava samputa. This is subjected for Laghu puta till the bhasma siddhi lakshana appears. The bhasma so formed will certainly attain the property of Niruttha.

S.No.	Drugs used	No. and Type of Puta	Reference
1	Swarnamakshika and Nimbu swarasa lepa	30 Laghu puta	R.R.S. 5/36
2	Swarnamakshika and snuhi ksheera lepa	Laghu puta	R.R.S. 5/37
3	Kajjali and Kumari swarasa lepa	2 Laghu putas	R.T. 16/26-28 A.P. 3/107-108
4	Shuddha Haratala and Shuddha Gandhaka	3 Kukkuta puta	R.T.16/22-25

Probable Physico-chemical changes during above processing

Rajata shodhana is done by Nirvapa method. Nirvapa include three phase viz. phase of heating, phase of quenching and phase of interaction.

- **Phase of Heating:** Solid has packed particles which are closed together and vibrate in their fixed position. When temperature increases, the particle gain energy, vibrate more strongly and occupy more spaces which is responsible for its expansion. Increase in intra-atomic distance leads to weakening of electrostatic forces. Due to continuous heating, particles get enough energy to break forces holding.
- **Phase of Quenching:** Red hot metals are dipped in liquid media immediately, so liquid may penetrate inside and liquid soluble impurities get dissolved. Sudden change in temperature causes breaking of other strong bonds and this destroys its flexibility and makes it more brittle.
- **Phase of Interaction:** During heating and dipping metal particles come in contact with liquid media, each molecule get surrounded by liquid and in self-cooling forming grain containing liquid media. This may be the reason of imposing of properties of Nirvapa Dravya (Liquid media). In this phase, three distinct stages like film boiling, nucleate boiling and convective heat transfer take place.

Film boiling, also known as "vapor blanket" stage, occurs upon initial immersion i.e. contact between the hot metal surface and liquid, creates a layer of vapor (known as the Leidenfrost phenomenon). It depends on the metal's surface irregularities, oxides, surface-wetting additives (which accelerate wetting and destabilize the layer) and

molecular composition liquid media. Cooling in this stage is a function of conduction through the vapor envelope and relatively slows since the vapor blanket acts as an insulator. As the part of cooling, the vapor blanket collapses at point's causes nucleate boiling (violent boiling of the quenchant) and heat transfer is fastest during this stage and it depends on molecular composition on by convection and conduction method, exponentially dependent on viscosity of liquid media. That's might be the reason for our Acharyas told to use different liquid media in process of Nirvapa.

Properties and Therapeutic Uses

चन्द्रलोहदलं शीतं तुवराम्लरसं सरम्। विपाकमधुरं बल्यं स्निग्धं रुच्यञ्च लेखनम्।।
शुक्रमेहघ्नमायुष्यं वयःस्थापनमुत्तमम्। वृष्यं मेध्यं विशेषेण वातपित्तप्रणाशनम्।। (R.T.16/14-15)

Rasa	Amla, Kashaya, Madhura
Guna	Guru, Snigdha, Mrudu, Sara
Veerya	Sheeta
Vipaka	Madhura
Doshaghnata	Vata Pitta Shamaka
Karma	Lekhana, Deepana, Balya, Rasayana, Ayushya, Vrushya, Medhya, Rechana, Saraka, best Vayastapaka, Rucchya, Garbhashaya Shodhaka, Vishanashaka.
Prayoga	Prameha, Pandu, Shwasa, Timira, Amlapitta, Kshaya, Hridroga, Jatrurdhva Vikaras, Praksheena Buddhi, Praksheena Smruti, Sootika Jwara, Urahshula, Ajeerna, Madaatyaya, Plihodara, Apasmara, Trishna, Gulma, Mukhashosha, Vatavyadhi, Kaamala, Shotha, Jalodara.

Dose

रक्तिकायास्तुरीयांशाद्रक्तिकैकमितं परम्। मृतं तारं नियुञ्जीत बलकालाद्यपेक्षया।। (R.T.15/54)

¼th - 1 Ratti (31-125 mg) considering the Bala, Kala and other factors

Anupana

Madhu, Godugdha, Navaneetha, Amalaki lehya, Triphala Kwatha or Roganusara Anupana.

Important Formulations

1. Agnikumar rasa
2. Apurva malini vasanta rasa
3. Bruhat vatachintamani
4. Chudamani rasa
5. Mehantaka rasa
6. Maha yogaraja guggulu
7. Vasantha kusumakara rasa
8. Mehahara rasa
9. Trailokyachintamani rasa
10. Brihat vangeshwara rasa

Research Updates

1. Sharma Ret al, **Physicochemical characterization and antibacterial activity of Rajata Bhasma and silver nanoparticle.** Ayu. 2016 Jan-Mar;37(1):71-75.

   Average particle sizes were in the range of 10–60 nm for RB and 5–50 nm for SNP. Almost 90% matters in the *Bhasma* are soluble and were analyzed using ICP-AES analysis and found to have 76%–90% silver content. Antibacterial activity of RB (500 ug) and SNP (500 ug) at the present concentration was evident only against *S. aureus. Escherichia coli, Pseudomonas aeruginosa, and Enterococcus faecalis* were found to be resistant to RB as well as SNP.

2. M. Durga Bhavani, et al, **Evaluation of Antioxidant Activity of Rajata Bhasma & Rajata Yoga.** AYUSHDHARA, 2016;4(3):1183-1187

   Oxidative stress has been demonstrated in many studies to participate in the progression of Diabetes and elevation of its complication incidence. From the results obtained from the present study, it can be confirmed that Rajata bhasma and Rajata Yoga have significant anti oxidant activity. Thus, we can conclude that Rajata Yoga may be used more effectively in the management of Prameha.

3. Rai et al., **Assessment of Hepatoprotective Activity of Rajata Bhasma in CCl4 Induced Hepatotoxicity Rats** Biomed. & Pharmacol. J,12(4), 1731-1735 (2019)

   The RB1 (Rajata bhasma 9 puta) and RB2 (Rajata bhasma 17 puta) have resilient antioxidant activity and may confer a favorable effect against oxidative stress. The RB1 and RB2 exhibited significant hepatoprotective activity in rats intoxicated with CCl4. Further the metal based nano particles size of bhasma enhances the bioavailability of therapeutic efficacy.

4. Yousuf Sahad et al, **Rajata sindoora-Experimental Study on Spermatogenic Activity.** J of Ayurveda and Hol Med (JAHM). 2019; 7(4): 1-14

   Study shows increase in sperm count (upto 95-99 million) which shows effect of Rajata Sindoora in spermatogenesis. It showed statistically significant spermatogenic activity compared to control group and standard group. Rajata Sindoora is competent with Standard drug Fertisure in Spermatogenic activity. Histopathology report of Testis of Albino rats shows normal Spermatogenesis.

Tamra (Copper)

Synonyms

ताम्र शुल्बं रक्तकं म्लेच्छवक्त्रं नेपालीयं त्र्यमबकं सूर्यलोहम्।
त्वाष्ट्रं त्वकं सूर्यपर्यायसंज्ञं द्विष्टं द्वयष्टं त्वम्बकं कीर्तितं तत्।।
उदुम्बरञ्चारविन्दं सूर्याङ्गं लोहितायसम्। रविप्रयं भास्करं च ताम्रकं च प्रकीर्तितम्।। (R.T.17/1-2)

Tamra	Shulba	Raktaka	Mlecchavaktra	Nepaliya
Tryambaka	Suryaloha	Twastra	Arka	Dwista
Dwayasta	Ambaka	Udumbara	Aravinda	Suryanga
Lohitayasa	Ravipriya	Bhasvara	Tamraka	

Vernacular Names

Sanskrit - Tamra
English - Copper
Hindi - Tamba, Tama, Tamma
Kannada - Tamra
Latin - Cuprum
Symbol - Cu

Minerological Identification

Copper is one of the few metals that can occur in nature in a directly usable metallic form (native metals). This led to very early human use in several regions, from 8000 BC. It was the first metal to be smelted from sulfide ores, the first metal to be cast into a shape in a mold and the first metal to be purposefully alloyed with another metal, tin, to create bronze.

Properties

Chemical Symbol	Cu
Colour	Copper red on a fresh surface, dull brown on a tarnished surface
Luster	Metallic
Crystal habit	Cubic or dodecahedral with modified faces
Cleavage	None
Specific Gravity	8.92
Diaphaneity	Opaque
Hardness (Moh's Scale)	2.5-3
Fracture	Hackly
Streak	Metallic copper red
Melting point	1085°C
Boiling point	2562°C

Sources and Occurrence

Copper is present in the Earth's crust in a proportion of about 50 parts per million

(ppm). Chile had become the world's leading producer of copper. Other major producers include Peru, China, and the United States. As per the classics only two places Nepala and Mleccha are the praptistana's.

In nature, copper occurs in a variety of minerals, including native copper. Copper pyrites and Copper Sulphide yields considerable amounts of Copper. Malachite, Azurite, Bornite, Peacock ore, Brass, Bronze, Bell-metal and German silver, Earthworms (Bhunaga), Peacock quills (Mayura Piccha) - all these also contain Copper.

Main Ores of the Copper are:

- Oxides type ores- Cuprite, Tenovite.
- Sulphides- Chalcopyrite ($CuFeS_2$), Copper pyrite,
- Chalcocite, glunce bronite, Couslite (CuS), Crubeslite.
- Grey copper- Tetrahedrite, Tenovite Fomatinite Enargite
- Sulphate- Chalcanthite (Cu_3 As S_3)
- Carbonates- Malachite, Azurite ($2CuCo_3$ Cu CoH_2)
- Silicates- Chrysocolla, dioptase
- Chloride– Atacamite

Types

नेपालं म्लेच्छकं चेति ताम्रं द्विविधमुच्यते। नेपालं जात्यमाख्यातं म्लेच्छकं त्ववरं स्मृतम्।। (R.T.17/7)

Two types of Tamra are described in Rasa Shastra literature.

1) Nepalaka 2) Mleccha

Out of which Nepalaka variety is considered as superior and useful for medicinal purposes.

सुस्निग्धं मृदुलं शोणं घनघातक्षमं गुरु। निर्विकारं गुणश्रेष्ठं ताम्रं नेपालमुच्यते।। (R.R.S.5/44)

Characteristics of Nepalaka Tamra are:

1. Susnigdha- Slimy appearance.
2. Mrudula- Soft and smooth to touch.
3. Shona- Reddish in colour.
4. Ghanaghata kshama- Can bear heavy strokes/Malleability
5. Guru- Heavy.
6. Nirvikara- Will not change by washing or any such acts/Doesn't have any crystal flaws.

Such Nepala variety of Tamra is said to be of superior quality.

सितकृष्णारुणच्छायमतिवामि कठोरकम्। क्षालितं च पुनः कृष्णमेतन्म्लेच्छकताम्रकम्।। (R.R.S.5/45)

CHAPTER EIGHT

Characteristics of Mlechaka Tamra are :-

1. Sitha, Krishna, Aruna chaya - having the shades of white, black and red colour.
2. Ativami - causes severe vomiting.
3. Katora - rough.
4. Kshalitham cha punaha Krishna - turns black even after washing.

Such Mlechaka variety of Tamra is said to be of inferior quality and not preferred for any therapeutic utility.

Grahya Lakshana

घनघातसहं सुचिक्कणं विमलञ्चाथ जपासुमप्रभम्। मृदु चैव सदाकरोद्भां रविलोहं खलू-कीर्तिमं वरम्।। (R.T. 17/8)

The Tamra is said to be genuine if it has the following qualities:

1. Ghanaghatasaha- It turns into a sheet like and never breaks by hitting the metal by a hard object.
2. Sachikkana- Smooth and glossy appearance.
3. Vimala- clean.
4. Japa suma prabha- Red colour like hibiscus.
5. Mrudu-soft.

Agrahya Lakshana

सदलं पाण्डुरञ्चैव कठिनं लघु भङ्गुरम्। समलं त्वरविन्दन्तु वर्जयेद्रसकर्मणिं।।
घनघातसहं कृष्णं श्वेतं लोहादिसङ्गतम्। अतिस्तब्धञ्च रूक्षञ्च ताम्रं त्याज्यं निगद्यते।। (R.T. 17/5-6)

The Tamra having following qualities should be rejected:

1. Sadala- with layers.
2. Pandura- yellowish white in colour.
3. Katina- hard.
4. Laghu- light.
5. Bhangura- brittle.
6. Samala- with impurities or adulterants.
7. Ghanaghata asaha- cannot with stand heavy strokes or which is not malleable or ductile.
8. Krishna Shweta lohadi sanghatam - adulterated with Black or white metals.
9. Atistabdha- more stiffness.
10. Rooksha- Rough.

Ashuddha, Apakwa and Avidhee Sevanajanya Dosha: (Tamra Astha Dosha)

अशुद्धं ताम्रपायुघ्नं कान्तिवीर्यबलापहम्। वान्तिमूर्छाभ्रमोत्क्लेदं न मृतं कुष्ठशूलकृत्।।
उत्क्लेदभेदभ्रमदाहमोहास्ताम्रस्य दोषाः खलु दुर्धरास्ते।

विशोधनात्तद्विगतस्वदोषं सुधासमं स्याद्रसवीर्यपाके।। (R.R.S 5/47-48)

The improper purification of copper exerts untoward effects called as 'ashta dosha' like:-

1. Bhrama
2. Moorcha
3. Vidaha
4. Sweda
5. Kleda
6. Vanti
7. Aruchi
8. Chitthasantapa

Shodhana

'तैले तक्रे गवां मूत्रे ह्यारनाले कुलत्थजे। क्रमान्निषेचयेत्तप्तं द्रावे द्रावे तु सप्तधा।
स्वर्णादिलोहपत्राणां शुद्धिरेषा प्रशस्यते'।। (R.R.S 5/13)

Thin sheets of Tamra is to be heated up to red hot on the flame and dipped into Tilataila, Takra, Gomutra, Aranala, Kulattha Kwatha for 7 times in each liquid media successively.

Vishesha Shodhana

I. Method

पत्रीकृतन्तु ताम्राणिं ज्वलने प्रतप्तं। चाङ्गेरिकादलरसे स्नपयेद्विधिज्ञः।।
इत्थं विशोधितमलं खलु सूर्यलोहं संयोजयेन्मृतिविधौ भिषजां वरेण्यः।। (R.T.17/12)

Tamra is made into thin sheets. These sheets are heated well till red hot and dipped in the Changeri patra rasa. This purifies the Tamra and can be used for marana process.

II. Method

R.R.S.5/50

Tamra patras are smeared with the paste of Saindava lavana and nimbu swarasa. They are dried and later heated to red hot and dipped in Kanji for 8 times.

III. Method

गोमूत्रेण पचेद्यामं ताम्रपत्रं दृढाग्निना । शुध्यते नात्र संदेहो मारणं चाप्यथोच्यते ।। (R.R.S.5/52)

Tamra patras or churna are tied in the pottali and boiled in Gomutra taken in dola yantra for 3 hours. This will make the Tamra shuddha after which it can be used for the purpose of marana.

S.No.	Drugs used	Method of Shodhana	Reference
1	Changeri patra rasa	Nirvapa	R.T.17/12
2	Saindava lavana and nimbu swarasa/ Kanji	Lepa, Nirvapa for 8 times	R.R.S.5/50
3	Gomutra	Pachana/Swedana	R.R.S.5/52
4	Saindava lavana and nimbu swarasa Nirgundi patra swarasa	Lepa, Nirvapa for 8 times	R.R.S.5/51
5	Saindava lavana and Kanji	Pachana/Swedana	R.T.17/14

Marana

I Method

जम्बीररससंपिष्टरसगन्धकलेपितम्। शुल्बपत्रं शरावस्थं त्रिपुटैर्याति पञ्चताम्।। (R.R.S.5/53)

Kajjali is prepared by triturating Shuddha Parada and Shuddha Gandhaka and the paste of Kajjali and nimbu rasa is smeared over the Shodhita Tamra patras. After these patras get dried up, they are confined in the Sharava samputa and subjected to Gajaputa. This process being performed 3 times will incinerate the Tamra and Tamra bhasma is formed.

II Method

Somanathiya Tamra Bhasma (R.R.S.5/65-67)

शुल्बतुल्येन सूतेन बलिना: तत्समेन च। तदर्धांशेन तालेन शिलया च तदर्द्धया।।
विधाय कज्जलीं श्लक्ष्णां भिन्नकज्जलसंनिभाम्। यन्त्राध्यायविनिर्दिष्टगर्भयन्त्रोदरान्तरे।।
कज्जलीं ताम्रपत्राणि पर्यायेण विनिक्षिपेत्। प्रपचेद्यामपर्यन्तं स्वाङ्गशीतं विचूर्णयेत्।। (R.R.S.5/65-67)

Shuddha Parada and Shuddha Gandaka are taken in equal quantity which is equal to the quantity of Shuddha Tamra and triturated well to make it Kajjali. To this Kajjali, half part of Shuddha Haratala and quarter part of Shuddha Manashila are added and triturated to make homogenous mixture. This mixture is placed in the Garbha yantra along with Tamra patras in such a way that alternate layers of Kajjali and Tamra patras are arranged within the yantra. The yantra is closed with a lid, sealed and heated intensively for 3 hours. After 3 hours of heating, allowed for swanga sheeta and bhasma inside the yantra is collected which is known as Somanathi Tamra bhasma.

S.No	Drugs used	No. and Type of Puta	Reference
1.	Shuddha Parada and Shuddha Gandhaka; Nimbu swarasa for bhavana; paste smeared over Tamra patras	3 Gaja puta	R.R.S.5/53
2.	Shuddha Tamra churna and Shuddha Hingula; Nimbu rasa bhavana + Shuddha Gandhaka	Heated for 3 hours in urdhwa patana yantra for 3 times; 2-3 Gaja puta	R.T.17/19-22
3.	Shuddha Tamra patras- 1 part, Shuddha Parada- 1 part, Shuddha Gandhaka-1 part, Shuddha Haratala-½part, Shuddha Manashila-part ¼	Heated in Garbha yantra for 3 hours placing the mixture and Tamra patras in alternate layers	R.R.S.5/65-67
4.	Shuddha Tamra churna- 1 part, Shuddha Parada- ¼ Part, Shuddha Gandaka- 1 part; Changeri patra swarasa bhavana	3 Gaja puta	R.T.17/23-24

5.	Shuddha Tamra patras- 1 part Shuddha Gandhaka - 2 parts	Heated in valuka yantra for 24 hours for 3 times	R.T.17/26-29

Amrutikarana

After bhasmikarana, Tamra Bhasma has to be subjected to the process of Amritikarana so that the Tamra bhasma will get rid of its ashta doshas.

I Method

सुमृतं ताम्रचूर्णन्तु तदर्धं गन्धकं तथा।
पञ्चामृतेन सम्पेष्य विधानज्ञो भिषग्वरः।।
शरावसम्पुटे न्यस्य ताम्रं विहितचक्रिकम्।
त्रिवारं पुटयेदेवं रसतन्त्रविचक्षणः।। (R.T.17/37-38)

1 part of Tamra bhasma and ½ part of Shuddha Gandhaka are taken, mixed thoroughly and Bhavana is done with Panchamruta (Gogrhrita, Godadhi, Godugdha, Sarkara and Madhu). Then Chakrikas are made, dried and subjected to Gajaputa. Similarly the whole process is repeated for 3 times.

II Method: (R.T.17/43-44)

Tamra Bhasma is triturated with Kumari Swarasa for 7 times. Then made Chakrikas, dried and subjected to Varahaputa. This whole procedure to be repeated for 7 times.

Probable Physico-chemical Changes During Above Processing

During Samanya Shodhana, Copper foils are heated and quenched into various liquid media having an alteration in their pH. The use of the acidic and alkaline solution as cooling media in the quenching process affects the hardness of the metal. Later even in Vishesha Shodhana, Copper foils are heated in cow's urine, heating the metal will displace atoms from their position and the displaced atoms form a new structure. This process was known as allotropic phase transformation. It alters the hardness, strength and ductility of the metal, increases brittleness, reduces the tensile strength and reduces the particle size of Copper foils, which will aid the further processing of Bhasma.

After the marana, the process of Amritikarana is adopted for Tamra. In this process, 13.18% gain in weight was observed in studies, it might be due to the toting up of some organic (calcium oxalate crystal) content from the Amorphophallus campanulatus (Surankanda) and also some amount of sulphur left over, that was evidenced by the SEM analysis. Organic matter present in the tuber could act as a source of carbon. The carbon reduction process could reduce any unstable metallic compound to the stable state, by which Tamra Bhasma becomes more stable chemically as well as therapeutically.

Properties and Therapeutic Uses

R.R.S.5/46

Rasa	Tikta, Kashaya, Katu and Madhura
Guna	Ushna, Snigdha, Laghu
Veerya	Ushna
Vipaka	Madhura
Doshaghnata	Kapha Pittanashaka
Karma	Lekhana, Ropana, Netrya, Deepana, Urdhwa and adhah shodhaka, Vishaghna, Mrutyuhara
Prayoga	Visha, Udara, Ama, Krimi, Sthoulya, Arshas, Kshaya, Panduroga, Kushta, Kasa, Shwasa, Peenasa, Amlapitta, Shotha, Shoola, Yakrit-Pleeha roga, Grhani, Mutrakrcchra, Jara, Arochaka, Jeernajwara

Dose

तत्तद्रोगहरानुपानसहितं ताम्रं द्विवल्लोन्मितं। (R.R.S.5/68)

अष्टमांशाद्रक्तिकाया रक्तिकार्द्धमितं परम्।
मृतं ताम्रं प्रयुञ्जीत वलकालाद्यपेक्षया।। (R.T.17/52)

According to R.R.S., 2 valla (6 Ratti- 750 mg) According to R.T., 1/8th to ½ Ratti (16-62 mg)

CHAPTER EIGHT

Anupana

Tattadrogunasara (According to the disease)

Management of Ashuddha, Apakwa and Avidhee Sevanajanya Dosha

मुनिव्रीहिं सितापानं धान्यकं वा सितासह। ताम्रदोषमशेषं वै पिबन्हन्याद्दिनत्रयम्।। (B.R.R.S)

If any untoward effects observed by the improper administration or administration of improperly processed Tamra bhasma, any of the following measures can be followed:

1. Munivruhi and sitha sevana
2. Dhanyaka and sitha sevena

Important Formulations

1. Arogyavardini Vati
2. Tamra parpati
3. Trivikrama rasa
4. Tamreshwara rasa
5. Hrudayarnva rasa
6. Kanchnabhra rasa
7. Gulmakalanala rasa
8. Chandramrutha rasa
9. Nithyananda rasa
10. Soothashekara rasa

Research Updates

1. Gulati S et al, **Pharmaceutical processing and analytical characterization of metal-based ayurvedic drug "Tamra Bhasma"**; Int J Pharm Sci & Res 2023; 14(4): 1940-53.

   Tamra Bhasma (TB) has been subjected to different physicochemical characterization using XRD and SEM-EDXA. The result suggests that Bhasma Parikshas (confirmatory tests) are the most reliable criteria to authenticate the formation of a good quality final product. TB was prepared in 19 Putas, maintaining a temperature range of 500°C-600°C. It is chemically Copper (II) sulphide, the compound formed is covellite as per XRD analysis and its particle size ranges between 10-50 µm as per SEM analysis. Cu and S are in major amounts 61.2% wt. and 36.3% wt. respectively; apart from that Si and Fe are also present in very fewer amounts as per EDXA findings.

2. Jagtap CY: **Role of Shodhana in preparation of Tamra Bhasma with respect to its anti-hyperlipidemic activity;** PG Dissertation Submitted to Gujarat Ayurved University; 2011.

   Tamra Bhasma prepared from Shodhita Tamra was reported to be safe in the sub-chronic study. In contrast, Bhasma prepared from Ashodhita Tamra was found to be toxic even at TED levels

3. Dr. Deeksha. C. et al, **Evaluation and Effect of Tamra Parpati Rasa Prepared with Asta Samskarita Parada over Colon Cancer a Cell Line Study;** IJTSRD;Volume-6; Issue-5, August2022, pp.1365- 1368.

   Tamra parpati rasa was tested for Anti-Cancerous activity over colon Cancer (Colo 205) with different concentration i.e- viz. 1000ug/ml, 500ug/ml, 250ug/ml, 125ug/ml, and 62.5ug/ml. Tamra Parpati Rasa showed maximum lyses effect with higher dosage 1000ug/ml i.e. 38.6% lyses was observed. The drug Tamra Parpati rasa was tested for its compatibility on cell Colo 205 (Epithelial cell) with five different concentrations with lyses. Sample showed the lyses effect on epithelial cell. This imply that Asta samskarita Parada preparation do possess higher therapeutic potency. Hence the study proved that the Tamra parpati rasa prepared with Asta samskarita Parada has promising Anti-Cancerous activity.

Loha (Iron)

Iron is the most useful metal among all the metals, might be because of its wide applications. In all systems of medicine, iron used for different ailments. In this modern era, man is extensively using the iron in every step. Therefore many scholars named this modern age as Iron age.

Synonyms

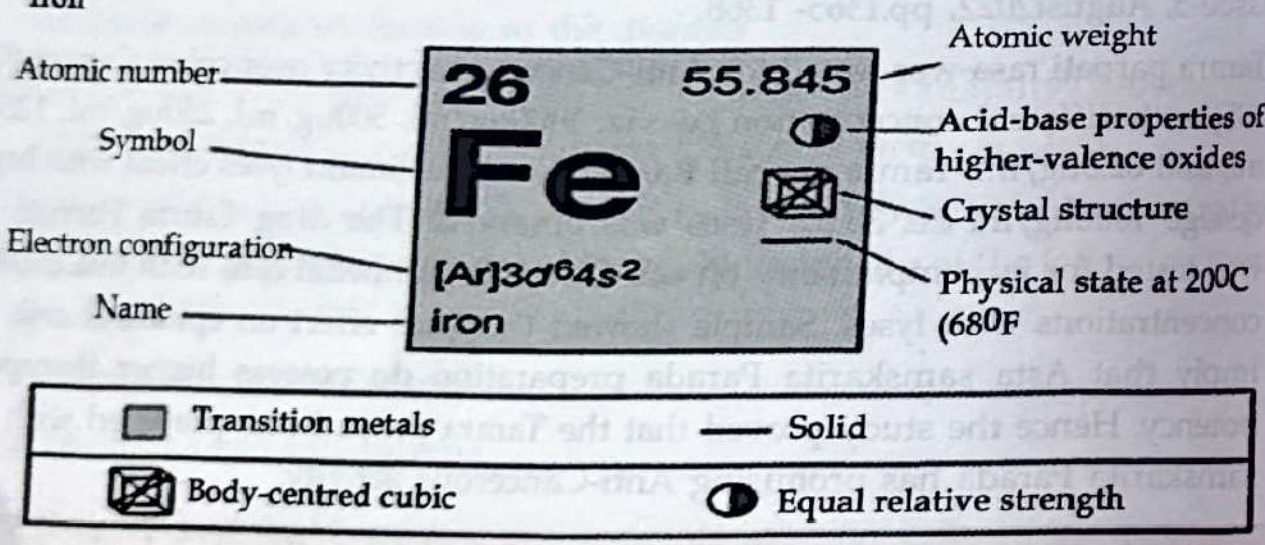
मुण्डं तथा मुण्डलोहं कृषिलोहं शिलात्मजम्। कृष्णायसं दृषत्सारमायसञ्च निगद्यते।।
लोहो लौहं लोहकञ्च शस्त्रलोहञ्च तीक्ष्णकम्। सारलोहं काललोहं त्वयश्च तदिहोच्यते।।
कान्तलोहं तथा कान्तं त्वयस्कान्तञ्च तन्मतम्। कान्तायसं महालोहं तदेव विनिगद्यते।। (R.T.20/2-4)

Mundaloha	Teekshnaloha	Kantaloha
Munda	Loha	Kantaloha
Mundaloha	Lauha	Kantam
Krishiloha	Lohaka	Ayaskanta
Shilatmaja	Shastraloha	Kantayasa
Krishnayasa	Teekshnaka	Mahaloha
Drishatsaara	Saraloha	Aya
Ayas	Kalaloha	

Vernacular Names

Sanskrit - Loha
English - Iron
Hindi - Loh
Kannada - Kabbina
Latin - Ferrum
Symbol - Fe

CHAPTER EIGHT



Minerological Identification

Iron is the fourth most common element consisting about 4.6% of the earth's crust. It is by mass the most common element on Earth, forming much of Earth's outer and inner core. Iron and steel form the foundation of modern industry, and are used in enormous quantities. Cast Iron, Wrought Iron and Steel are the main forms in which

Iron appears in commerce. Their different properties are primarily due to the presence of varying amounts of carbon.

Properties

Chemical Symbol	Fe
Colour	Iron black, Dark gray, Steel gray
Cleavage	Perfect
Crystal habit	Granular - Generally occurs as anhedral to subhedral crystals in atrix.
Specific Gravity	7.86
Diaphaneity	Opaque
Hardness (Moh'r Scale)	4-5
Luster	Metallic
Fracture	Hackly- Jagged
Streak	Gray
Melting point	1,535₀ C
Boiling point	2,862₀ C

Sources and Occurrence

Naturally, Iron is not available in greater amounts in its free form, mostly available in combined form. In India, It is available in Bihar, Orissa, Bengal, Madhya Pradesh, Uttar Pradesh, Punjab, Tamil Nadu and Karnataka. It is also available in countries like England, Germany, Japan, America, Nepal, Bhutan, Afghanistan etc.,

Important Ores of Iron

Magnetite (Fe_3O_4) containing 72.4% (Fe) Heamatite (Fe_2O_3) containing, (70% Fe) Goethite FeO(OH) containing 68.5% Fe.

Limonite $2Fe_2O_3.3H_2O$ and siderite ($FeCO_3$) containing 48.3% Fe.

Less important ores are the sulphides, pyrite, (FeS_2)

Types

मुण्डं तीक्ष्णं तथा कान्तं लौहं त्रिविधमुच्यते। मुण्डात्तीक्ष्णं ततः कान्तं प्रशस्तं परिकीर्तितम्।। (R.T.20/1)

Loha is of 3 types

1. Munda loha 2. Teekshna loha 3. Kanta loha

Among the above 3 types of loha, they are successively superior in their properties. Teekshna loha is better in its therapeutic property when compared with the Munda loha and Kanta loha possesses still more therapeutic property than Teekshna loha.

CHAPTER EIGHT

मृदु कुण्ठं कडारञ्च त्रिविधं मुंडमुच्यते। खरं सारञ्च हृन्नालं तारावट्टञ्च वाजिरम्।।
काललोहाभिधानं च षड्विधं तीक्ष्णमुच्यते। भ्रामकं चुम्बकञ्चैव कर्षकं द्रावकं तथा।
एवं चतुर्विधं कान्तं रोमकान्तञ्च पञ्चमम्।। (R.R.S.5/68-70)

Three types of Lohas are further classified into following sub types

Munda Loha	Tikshna Loha	Kanta Loha
Mrudu	Khara	Bhramaka
Kuntha	Sara	Chumbaka
Kadara	Hrunnala	Karsaka
	Taaravatta	Dravaka
	Vajira	Romakanta
	Kala loha	

Characteristics of Different Types of Loha

Lakshanas of the types of Munda loha

द्रुतद्रावमिस्फोटं चिक्कणं मृदु तच्छुभम्।
हतं यत्प्रसरेद्दुःखात्तत्कुण्ठं मध्यमं स्मृतम्।।
यद्धतं भज्यते भंङ्गे कृष्णं स्यात्तत्कडारकम्।। (R.R.S.5/71)

1. Mrudu Munda Loha- Melts quickly on heating, will not break on heavy strokes, Chikkana (slimmy), Mrudu (soft), it is of superior quality, auspicious and have good malleability property.
2. Kunta Munda Loha- Spreads with difficulty on heavy strokes, it is of medium quality and have comparatively lesser malleability property.
3. Kadara Munda Loha- Breaks on heavy strokes, broken surface is black in colour, it is of inferior quality.

Uses of Munda Loha

कटाहपिष्टपचनखल्वादीनां विशेषतः। निर्माणाय, मुण्डलोहं साम्प्रतं विनियुज्यते।। (R.T.20/5)

Munda loha is used in manufacturing different vessels which can be used for cooking, making khalva and other instruments.

Lakshanas of the types of Teekshna Loha (R.R.S.5/77-83)

Pogara

'अङ्गच्छाया च वङ्गञ्च पोगरस्याभिधात्रयम्। चिकुरं भङ्गुरं लोहात्पोगरं तत्परं स्मृतम्।। (R.R.S.5/80)

When the iron is broken, the cut surface is observed for three criteria- Anga (appearance), Chaya (lusture) and the Vanga (hairy structure). These 3 terms are also considered as the synonyms of pogara. Pogara is the brittle and hairy structure seen over the cut surface of the iron.

1. **Khara Teekshna Loha-** Hard, devoid of Pogara, the broken surface is lustrous like Parada, breaks when bent
2. **Sara Teekshna Loha-** On strong hitting of hard surface, the edges of the weapons made of this type of loha will mutilates, exhibit pogara property, available in the place where there is a whitish yellow soil.
3. **Hrunnala Teekshna Loha-** Blackish to pale white in colour, there is a presence of pogara in it resembling the castor seeds, this type is extremely hard and very difficult to cut.
4. **Taravatta Teekshna Loha-** Description about this type is not mentioned in the classics.
5. **Vajira Teekshna Loha-** Consists of pogara having minute lines and highly shining like Vajra, more strong and massive, its colour is shyama (bluish black).
6. **Kalayasa Teekshna Loha-** Its colour is Neelakrishna (bluish black), dense, soft, heavy and lustrous, its edges will not distorted by the impact of hard stroking.

Among above 6 types of Teekshna loha, each lohas are 100 times superior successively than the previous ones. (Sara loha is 100 times superior than khara loha and likewise).

Uses of Teekshna Loha

कृपाणादिविनिर्माणे तीक्ष्णलोहं प्रयुज्यते। (R.T.20/6)

Teekshna loha is used in the manufacturing of sharp instruments like Knife and others

Lakshanas of the types of Kanta Loha (R.R.S.5/90-91)

1. **Bhramaka Kanta Loha-** When small pieces of iron comes in the vicinity of Bhramaka kanta loha, they moves and revolves around it.
2. **Chumbaka Kanta Loha-** When small pieces of iron comes in the vicinity of Chumbaka kanta loha, it pulls the iron pieces and they get attach to it.
3. **Karsaka Kanta Loha-** When small pieces of iron comes in the vicinity of Karshaka kanta loha, it attracts the iron pieces towards it.
4. **Dravaka Kanta Loha-** When small pieces of iron comes in the vicinity of Bhramaka kanta loha, it pulls or repels the iron pieces from far distances. And when this type of loha melts, it also melts iron pieces along with it.
5. **Romakanta Kanta Loha-** When small pieces of iron comes in the vicinity of Bhramaka kanta loha, they would stand erect like hairs.

Among the above types of Kanta lohas, Bhramaka is said to be inferior, Chumbaka is of medium quality, Karshaka is said to be superior and Dravaka type is best among all the Kanta Lohas.

एकद्वित्रिचतुष्कञ्चसर्वतोमुखमेव तत्। पीतं कृष्णं तथा रक्तं त्रिवर्णं स्यात्पृथक्पृथक्।। (R.R.S.5/86)

Each of the above types of Kantalohas are again classified into Ekamukha, Dwimukha, Trimukha, Chaturmukha and Sarvathomukha.

Based on the colour, each Kantaloha is of three types:

1. Peeta- Brahma resides in it- Sparshavedhi (converts into Gold by mere touch).
2. Krishna- Vishnu resides in it- Rasayana.
3. Rakta- Maheswara resides in it- useful for making Parada bandha.

Grahya Lakshana

उज्ज्वलं लोहफलकं धात्रीकाशीसलेपितम्। गिरिशृंगांकितं यत्स्यात्तीक्ष्णलोहं तदुत्तमम्।। (R.T. 20/8)

Teekshna loha is considered to be of best quality if it possess the following qualities:

1. When the lepa of Kasisa and Amalaki swarasa is applied over the flat sheets of Teekshna loha, then it is rubbed and washed, by this Loha will become more bright and shinning.
2. The application of the same lepa will cause Girishrnga (conical protrusion) over the surface of Teekshna loha.

पात्रे यस्य प्रसरति जले तैलबिन्दुर्न लिप्तं। गन्धं हिङ्गु त्यजति च तथा तिक्ततां निम्बकल्कः।।
पाके दुग्धं भवति शिखराकारताकं नैति भूमौ। कान्तं लोहं तदिदमुदितं लक्षणोक्तं न चान्यत्।। (R.R.S 5/95-96)

Genuine Kanta loha will possess the following qualities:

1. When drop of oil is put on water in the vessel of Kanta loha, it wont spread.
2. When hingu is applied to the vessel made of kantha loha it will loose its smell.
3. When nimba kalka is applied, it will loose its bitterness .
4. When milk is boiled in the Kanta loha vessel, it forms conical shape but never spills out.

Ashuddha, Apakwa and Avidhee Sevanajanya Dosha

अशुद्धलोहं न हितं निषेवणादायुर्बलं कान्तिविनाशि निश्चतम्।
हृदि प्रपीडां तनुते हापाटवं रुजं करोत्येव विशोध्य मारयेत्।। (R.R.S.5/75)

Consumption of Ashodhita loha causes:

1. Ayunasha
2. Balanasha
3. Kanthinasha
4. Hritpeeda
5. Shareera shaithilya
6. Ruja

Hence Loha should be subjected to proper shodhana before its incineration.

Shodhana

Loha should subjected to samanya and Vishesha shodhana

CHAPTER EIGHT

Samanya Shodhana

'तैले तक्रे गवां मूत्रे ह्यारनाले कुलत्थजे। क्रमान्निषेचयेत्तप्तं द्रावे द्रावे तु सप्तधा।
स्वर्णादिलोहपत्राणां शुद्धिरेषा प्रशस्यते'।। (R.R.S 5/13)

Thin sheets of Loha is to be heated up to red hot on the flame and dipped into Tilataila, Takra Gomutra, Aranala, Kulattha Kwatha for 7 times in each liquid media successively.

Vishesha Shodhana

I Method

सामुद्रलवणोपेतं तप्तं निर्वापितं खलु। त्रिफलाक्वथिते नूनं गिरिदोषमयस्त्यजेत्।। (R.R.S.5/104)

Thin sheets or foils of Loha is smeared with the paste of Samudra lavana and after drying, Loha is heated to red hot and dipped in Triphala kwatha. Repeating this process for several times or 7 times will purify the Loha by removing the giridosha.

II Method

अतिसुक्ष्मरजस्त्वयसा ज्वलने परितप्तमलं मुनिवारमिह। कदलीनवमूलजले नियतं विमलत्वमुपैति निषेचनत:।।
(R.T.20/17)

Fine powder of Loha taken in darvi and heated red hot on high flame and later the red hot iron powder dropped in Kadali kanda swarasa. This process repeated several times or 7 times will make the Loha shuddha.

S.No.	Drugs used	Method of Shodhana	Reference
1	Samudra lavana lepa, Triphala kwatha	Nirvapa	R.R.S.5/104
2	Chinchaphala jala or kwatha or Triphala kwatha prepared using Gomutra	Nirvapa	R.R.S.5/105
3	Kadali kanda swarasa	Nirvapa	R.T.20/17
4	Triphala kwatha	Nirvapa for 7 times	Rasamrita.3/132-133
5	Triphala kwatha and Gomutra	Nirvapa for 7 times	R.T.20/1

Marana

3 types of Loha paka:

प्रथमं भानुपाकेन स्थालीपाकात्तत: परम्। पुटपाकेन पक्वञ्च लौहं सुमृतिमाप्नुयात्।। (R.T.20/20)

Three types of Pakas has been told to obtain the appropriate Loha bhasma. Purified Loha has to be subjected to the below mentioned pakas in the successive order:

1. Bhanu paka
2. Sthali paka
3. Putapaka

1. Bhanu Paka

वराक्काथयुतं लौहं भानोः प्रखरभानुभिः। शुष्यन् विपच्यते यस्माद् भानुपाकस्ततः स्मृतः।। (R.T.20/21)

Shuddha Loha churna is taken in a wide mouth vessel along with the sufficient quantity of Triphala kwatha and kept in hot sun till the complete evaporation of the liquid and Loha churna get dries up. Same procedure should be repeated for 7 times. This process is called as Bhanu paka.

2. Sthali Paka

त्रिफलाक्काथितोपेतं लौहं स्थाल्यां खराग्निना । शुष्यन् विपच्यते यस्मात् स्थालीपाकस्ततः स्मृतः।। (R.T.20/25)

After Bhanu paka, Loha churna is taken in a suitable vessel along with the sufficient quantity of Triphala kwatha and kept over fire and heated till the complete evaporation of the liquid and Loha churna get dries up. Same procedure should be repeated for 7 times. This process is called as Sthali paka.

3. Puta Paka

रसादिभिर्भेषजानां खल्वे लौहं चिमर्दितम्। पुटस्थं पच्यते यस्मात् पुटपाकस्ततः स्मृतः।। (R.T.20/31)

After Sthali paka, Loha churna is triturated with the swarasa or kwatha of specified drug and dried. This dried powder confined in the Sharava samputa and subjected to puta. This process is called as Puta paka.

CHAPTER EIGHT

I Method

अथ पूर्वोदितं तीक्ष्णं वसुभल्लकवासयोः। पुटितं पत्रतोयेन त्रिंशद्वाराणि यत्नतः।।
शोणितं जायते भस्म कृतसिन्दूरविभ्रमम्।। (R.R.S.5/116)

Shuddha Teekshna churna is triturated with Shweta punarnava swarasa and Vasa swarasa and dried. This dried powder is enclosed in Sharava samputa and subjected to Gajaputa. This Procedure is repeated for 30 times. Such 30 Gajaputas will yield the Loha bhasma which is red in colour.

II Method

समगन्धमयश्चूर्णं कुमारीवारिभावितम्। पुटीकृतं कियत्कालमवश्यं म्रियते ह्ययः।। (R.R.S.5/123)

Shuddha Teekshna churna is mixed with equal quantity of Shuddha Gandhaka churna to form homogenous mixture and this mixture is triturated with Kumari swarasa. Later chakrikas are made, dried, confined to Sharava samputa and subjected to Gaja puta till the bhasma siddhi lakshanas appears.

S.No	Drugs used	No. and Type of Puta	Reference
1	Shweta punarnava swarasa and Vasa swarasa bhavana	30 Gajaputa	R.R.S.5/116
2	Shuddha Gandhaka; Kumari swarasa bhavana	Gajaputa	R.R.S.5/123

3	Gomutra, Triphala kwatha bhavana	21 Gajaputa	R.R.S.5/125-126
4	Nimbu swarasa bhavana	50 Gajaputa	R.T.20/61-63

Loha Nirutthikarana

मृतं लौहं गव्यमाज्यं तथा शुद्धञ्च गन्धकम्। दत्त्वा कन्याम्भसा पिष्ट्वा शुष्कचूर्णञ्च कारयेत्।।
सम्पुटस्थं ततः कृत्वा पुटेद् गजपुटे भृशम्। इत्थमेकपुटेनैव भवेल्लौहं निरुत्थितम्।। (R.T.20/80-81)

Loha basma is mixed with the equal quantities of Goghrita and Shuddha Gandhaka. This mixture is done bhavana with Kumari swarasa and triturated till it becomes dry powder. Powder is enclosed in Sharava samputa and subjected to Gaja puta. Like this, one Gajaputa will make the bhasma Niruttha.

Probable Physico-chemical changes during above processing

Lauha, on heating reacts with atmospheric oxygen to form ferric oxide, which can be easily absorbed by the body, where all the Dhatus are purified by heating and quenching into the Taila, Takra, Gomutra, Kanji and Kulattha Kwatha. This Shodhana offers brittleness to the drugs; helps in layer separation and makes it fit for further processes.

Tila taila is having Ushna veerya and Sukshma guna. Sesame oil contains Sesamin, Sesamatine and a most potent active component called Sesamol which acts as a chelating agent. Chelating agent are the chemical compounds that react with metal ions to form a stable, water soluble complex which in turn helps to convert the heavy metals/mineral into absorbable form in the body. A study shows that sesamol is effective anti-oxidant and it is antiphoto oxidative because it scavenges single oxygen. Sesame oil attenuates lead and iron-induced hepatic toxicity. It exhibits the protective effect by inhibiting pro-inflammatory mediators, free radical generation, oxidative stress and lipid peroxidation thus increasing the anti-oxidant effect. By doing Shodhana with sesame oil, the probable toxic effect that would be caused by iron is inhibited/nullified. So, Nirvapa with sesame oil will make the drug effective both prophylactically and therapeutically.

Takra is Ushna in nature. Buttermilk contains casein, whey proteins and small amount of fat. Studies showed that buttermilk is having Hydroxyl radical scavenging property and Anti-oxidant activity. It also helps in inhibition of lipid peroxidation. On administration of improperly purified Loha bhasma as a medicine, it may acts as a catalysts for production of hydroxyl radical (.OH), thus leading to lipid oxidation which may cause cell damage. Buttermilk is having the capacity to retard lipid oxidation reactions as it is having affinity to sequester Fe^{2+} and Fe^{3+} ions.

Gomutra is having Ushna veerya, Teekshna guna and Kshara quality. It is found that Cow's urine contains various inorganic elements like Silver, traces of Gold, Vit A,B,C,D,E, Calcium salts, Sulphur, Phosphate, Na, Fe etc. It also constitutes Ammonia,

Uric acid and Hippuric acid. Among them Ammoniated citric acid is known to dissolve Fe_2O_3 and form water soluble Fe2+ and Fe3+ complexes. Uric acid is also known to form Ureate-Fe3+ and Ureate-Fe2+ complexes. Thus the presence of Ammonia and Uric acid in Cow's urine results in formation of complexes with iron those are soluble in water. Studies also show that Cow's urine is having Hepato-protective activity and Bio-enhancing property.

Kanji/Aranala is having Ushna veerya, Teekshna guna and Bhedana property. Sour rice gruel contains high levels of phytic acid, a chelating agent and it is found that it reacts with Fe2+ or Fe3+ salts giving rise to iron complexes. Thus Nirvapa in Kanji may help to remove Fe3+ through formation of coordination compounds.

Kulatha is having Ushna veerya and Bhedana property. One of the major constituents of horse gram is gallic acid. Gallic acid (3,4,5- trihydroxybenzoic acid) is one of the naturally occurring polyphenols abundently present in most of the herbal and Ayurvedic preparations. A study was done to understand the role of gallic acid present in Kulatha kwatha in the preparation of Loha bhasma. And the study showed that gallic acid, which has one $-CO_2H$ and 3 phenolic groups, coordinates with iron through the two phenolic groups giving rise to an octahedral complex with D3 symmetry. The thermal analysis showed that the complex was stable up to 850°C and the complex formed was soluble in water. Thus gallic acid present in Kulatha is responsible in removing Fe3 present in the raw material there by reducing the toxicity of Loha.

All the Drava dravyas used for Samanya shodhana of metals are having Ushna veerya, Teekshna and Sukshma guna with Bhedana quality. Most of them are acidic/ alkaline in nature and they acts as a chelating agents. So Shodhana of Loha by Nirvapa method makes metal free from soluble, volatile, washable and thermo-stable impurities, thus metal become fragile.

Heating and quenching seven times in Triphala kwatha for vishesha shodhana, also the reference of gomutra and triphala kwatha, Kadalikanda swarasa, chincha kshara, shasak rakta are told for vishesha shodhana. Nirvapa and Nivarpa after Lepana these are two procedure used for Vishesha Shodhana. After Vishesha Shodhana in Lauha, there is further reduction in the particle size due to Tannins and Acidic nature of Triphala kwatha. Triphala contains ascorbic acid which increases the bioavailability of Iron by converting Fe3+ to Fe2+. Repetition in heating and cooling just like in samanya and vishesha shodhana causes disruption in compression tension equilibrium and leads to increased brittleness, reduction in hardness, and finally reduction in the particle size.

During incineration or Marana metals are converted into its mixed oxides. Zero valiant metal state is converted to metal oxides of higher oxidation state, by this process. Toxic nature of the resulting metal oxide is completely destroyed while medicinal properties are introduced in this process. For Lauha marana or incineration process

Trividha paka method that are Bhanupaka, Sthalipaka and Putapaka are employed. The role of sunlight during bhanupaka has very specific reason. It has been widely established that the metallic Fe is toxic. Hence, Fe supplements should contain Fe in the form of complex. The ultraviolet radiation present in the sunlight reduces the oxidation state of Fe in the presence of Vitamin C present in the Triphala decoction thereby improving the bioavailability. In this process, iron reacts with moist air in an open condition with reacting liquid media for prolonged period converts the iron into its oxide form. The resultant product is then subjected to Sthalipaka to further hasten the process by subjecting it to direct heat to convert any remaining Lauha into its oxide form totally.

Triphala is a mild laxative and thereby counteracts the constipating property of Fe and thus be beneficial due to which Rasa Acharyas might have mentioned Triphala in maximum lauha bhasma preparations.

Properties and Therapeutic Uses

Rasa	Tikta, Madhura, Kashaya
Guna	Guru, Ruksha, Sara
Veerya	Sheeta
Vipaka	Madhura
Doshaghnata	Tridoshanashaka
Karma	Lekhana, Balya, Vrushya, Ayushya, Vayastapaka, Varnya, Medhya, Chakshushya, Yogavahi, Raktavardhaka, Koshtashodhaka, Vajikara, Veeryavardhaka, Putrapada
Prayoga	Shotha, Shoola, Arshas, Bhagandara, Atisara, Pandu, Kamala, Krimi, Shosha, Pleeha roga, Medoroga, Kushta, Raktaja roga, Gulma, Udara, Hrdroga, Shwasa, Kasa, Prameha, Grahani, Jwara, Amavata, Bhrama, Peenasa, Vamana, Aruchi, Vandyatva, Shweta pradara, Amlapitta,

Dose

आरभ्य गुञ्जपादांशात् गुञ्जाद्वितयसंमितम्। मृतं लौहं प्रयुञ्जीत प्राणाचार्यः प्रयत्नतः।। (R.T. 20/18)

¼th - 2 ratti (32 mg to 250 mg)

Anupana

Triphala and Madhu, Ksheera, Trikatu, Madhu, Ghrita.

Management of Ashuddha, Apakwa and Avidhee Sevanajanya Dosha

मुनिरसपिष्टविडङ्गं मुनिरसलीढं चिरं स्थितं घर्मे। द्रावयति लोहदोषान् वह्निर्नवनीतपिण्डमिव।। (A.P.3/230)

If any untoward effect of Loha bhasma caused by its improper processing or improper administration is observed, then Agastya patra swarasa mardita vidanga churna should be administered along with Agastyapatra swarasa and later aatapa

sevana is advised. By this, Loha dosha get dissolved just like Navaneeta which melts on heating.

Pathya-Apathya

कूष्माण्डं तिलतैलं च माषान्नं राजिकां तथा।
मद्यमम्लं मसूराश्च त्यजेल्लोहस्य सेवकः।। (A.P.3/229)

Apathya- Kushmanda, Tila taila, Mashanna, Rajika, Madhya, Masura.

Important Formulations

1. Dhatri loha
2. Saptamruta loha
3. Lohaparpati
4. Kanchanabhra rasa
5. Kshyakesari rasa
6. Navayasa Loha
7. Mrutyanjaya Loha
8. Agnikumara rasa
9. Pradarantraka loha
10. Chandraprabha vati

Research Updates

1. Aditi Kulkarni et al., **Study of effect of Ayurvedic Pharmaceutical processing named Shodhana and Marana on the Chemical Composition and Crystalline structure of Metal Iron and Iron-containing Minerals using XRD and XRF analysis;**Int J Pharm Pharm Sci, Vol 13, Issue 10, 35-42

   Pharmaceutical procedures such as *Shodhana* and *Marana* described in Ayurvedic classics, bring about a change in elemental composition and crystalline structure of the processed material. In the present study, such a change was studied and confirmed through XRD and XRF analysis. It is conclusively said that a change in the chemical constitution and crystalline structure is observed in the metal *Loha* (Iron) and iron-containing minerals *Gairika* (red ochre), *Mandura* (iron slag), *Kasisa* (green vitriol), and *Suvarnamakshika* (Copper pyrite) as a result of *Shodhana* and *Marana*. The basic iron element is transformed into its oxide. Apart from Iron oxide, the end product *Bhasma* is also observed to contain few trace elements like-K, Ca, P, AL, O, Ma, Zn. The presence of trace elements is deemed to be a result of the processing of the raw material with different types of plant materials.

2. Milind G. Rajguru et al., **To evaluate the effect of lohacontent ayurvedicremedies to increase hemoglobin percentage in iron deficiency anaemia;** Ayurlog: National Journal of Research in Ayurved Science-2019; (7)(1):1-4

   Mean score of hemoglobin percentage before treatment was 9.83 and after treatment it increase up to 10.65 i.e. average haemoglobin percentage increase up to 0.82 gm/dl in seven weeks of treatment and is statistically significant. Therefore it is concluded that Loha content remedies is useful ayurvedic treatment for curing iron deficiency anaemia and for increase haemoglobin percentage.

3. Rakesh Parasharet al., **A clinical evaluation and comparative study of Loha rasayana and Tryushanadya Loha in the management of Sthaulya (obesity).** Int J Appl Res 2015;1(9):636-639.

The study was conducted in sixty clinically diagnosed patient of Sthaulya (Obesity). It was observed that the patient of Sthaulya Roga treated with Loharasayana & Trushana Loha showed good results on reducing their body weight

4. Santhosh B et al., **Nephro-protective activity of varunadi loha - An experimental study.** Anc Sci Life. 2012 Dec;32(Suppl 1):S21.

Significant decrease in serum creatinine and serum urea in curative group was suggestive that the drug Varunadi loha was delivering its best to improve the lost kidney function.

Mandura (Rust Iron)

Mandura is nothing but the iron rust/Iron oxide which is formed when iron is exposed to oxygen in air and water or water vapor for long time. Iron oxides are chemical compounds composed of iron and oxygen. There are sixteen known iron oxides and oxyhydroxides, the best known of which is rust, a form of iron oxide.

Definition

प्रतापित्तस्य लोहस्य घनाघातच्युतं मलम्। कालेन पिण्डतां याति क्षितौ, मण्डूरमुच्यते।। (R.T. 20/123)

The iron, when heated to red hot and hit strongly by hammers or other instruments in places like blachsmith's workshop, factories etc., scatters small pieces of iron all over. In due course of time, these small pieces become rusted and these iron slag forms a mass. This is called as Mandura.

Synonyms:

मण्डूरं तु समाख्यातं किट्टं लोहभवं तथा। लोहकिट्टं लौहमलं लौहोच्छिष्ठ तन्मतम्।। (R.T. 20/124)

Kittam	Lohabhavam	Lohakittam
Lohamalam	Lohochista	Lohasinghanaka

Vernacular Name

Sanskrit : Mandoora

English : Rust of the Iron

Hindi : Lohe ka jang

Kannada : Mandura, Tukku kabbina

Mineralogical Identification

Mandura is a metallic oxide cum silicate of iron which is formed when iron

exposed to the air, water and sun. Chemically, mandura is the combination of ferric oxide (59.14%), ferrous oxide (26.7%), chlorides (4.4%), magnesium (3.9%), sodium (1.9%) and few other trace elements.

Chemical composition	Fe_2O_3
Colour	Black
Cleavage	None
Specific gravity	3 to 3.8
Transparency	Opaque
Hardness (Moh's Scale)	6 to 6.5
Luster	Dull
Fracture	Conchoidal
Streak	Black

Types: A.P.3/287-288

In Ayurveda prakasha, 3 types of Mandura/Loha kitta are mentioned:

1. **Munda Loha Kitta-** Shona (Red), Guru (heavy), Snigdha (smooth).
2. **Tikshna Loha Kitta-** Anjana prabha (black), Guru (heavy), Nirvrana (aberration free)
3. **Kanta Loha Kitta-** Pinga (reddish black colour), Rooksha (rough), Gurutama (more heavy), Deergha (lengthy), Akotara (aberration free), Chinnam rajatacchaya (cut surface exhibits silver like shine).

Munda Mandura is ten times effective than mandura. Tikshna mandura is hundred times effective than munda, Kanta mandura is thousand times effective than tiksna Mandura.

Grahya Lakshanas

स्निग्धं गुरु दृढं चैव कृष्णं कोटरवर्जितम्। जीर्णं नष्टपुरःस्थञ्च मण्डूरं ग्राह्यमुच्यते।। (R.T. 20/126)

Genuine Mandura will have the following qualities:

1. Snigdha- Unctous
2. Guru- Heavy
3. Dhruda- Strong
4. Krishna- Black
5. Kotaravarjita- Devoid of fissures or furrows
6. Jeernanashta purastham- taken from age old constructions

षष्टिवर्षोयमधमं मध्यं सप्ततिवार्षिकम्। सर्वश्रेष्ठं समाख्यातं मण्डूरं शतवार्षिकम्।। (R.T. 20/125)

Mandura which is 60 years old is said to be adhama (inferior quality), that which is of 70 years old is madhyama (average quality) and Mandura which is 100 years old is the sarvashreshta (superior quality).

CHAPTER EIGHT

Shodhana

ध्मातं विभीतकाङ्गरैर्गोमूत्रं परिषेचितम्। सप्तवारं लोहमलं शुद्धिमायात्यनुत्तमाम्।। (R.T. 20/127)

Loha mala or mandura is heated to red hot using dry wood of Vibhitaki tree or burning charcoal and dipped in the Gomutra. This procedure repeated for 7 times will purify the Mandura.

Marana:

Method: R.T.20/129-130

Shuddha Mandura is powdered in khalva yantra and triturated with the Triphala qwatha. This is dried, enclosed in sharava samputa and subjected to Gajaputa. The entire procedure is repeated for 30 times. After 30 Gajaputas, red coloured bhasma resembling the Raktachandana varna will be obtained and this can be used for all therapeutic purposes.

S.No	Drugs used	No. and Type of Puta	Reference
1	Triphala qwatha for bhavana	30 Gaja puta	R.T.20/129-130
2	Swrasa/qwatha of Loha maraka gana dravya for bhavana	30 Gaja puta	R.T.20/131
3	Kumari swarasa for bhavana	7 Gaja puta	Rasamrutha

Probable Physico-chemical changes during above processing

Chemical assay on mandura reveals its presence of silica and iron content. The concept of sodhana for Mandura may be aimed at reducing the silicate content and making it more iron oxide concentrated. Physical properties of mandura include magnetic nature and bhasmeekarana process destroys the property of magnetism.

Properties and Therapeutic Uses

Rasa	Kashaya, Madhura
Guna	Rooksha, Laghu
Veerya	Sheeta
Vipaka	Katu
Doshaghnata	Pittakapahahara
Karma	Vrushya, Agnideepaka, Ruchikara, Raktavruddhikara
Prayoga	Pandu, Kamala, Angamarda, Shosha, Shopha, Halimaka, Pleehavruddhi, Krimi, Arshas

Dose

आरभ्य गुञ्जापादांशाल्लोहमात्राविधानवित्। गुञ्जाद्वितयपर्यन्तं मण्डूरं विनियोजयेत्।। (R.T. 20/135)

¼th - 2 Ratti (31-250 mg)

Anupana

Triphala qwatha, Madhu, Ksheera, Ghrita, Navaneeta.

Important Formulations

1. Punaranava Mandura
2. Triphala Mandura
3. Mandura Vataka
4. Shothari Mandura
5. Satavari Mandura
6. Mandura Vataka
7. Tapyadi Mandura
8. Rasaabhra Mandura

Research Updates

1. Mulik SB et al., **Physicochemical characterization of an Iron based Indian traditional medicine: Mandura Bhasma.** Anc Sci Life. 2011 Oct;31(2):52-7.

   The particular method adapted in this study for Mandura bhasma preparation converted Fe_2SiO_4 of the raw material into a mixture of Fe_2O_3 and SiO_2 in the final product i.e. Mandura bhasma. The techniques employed for purification and calcination of Mandura significantly reduced the particle size in Mandura bhasma. This reduced particle size may facilitate absorption and assimilation of the Mandura bhasma into the body.

2. Pandya MG et al, **A clinical study of Punarnava Mandura in the management of Pandu Roga in old age (geriatric anemia).** Ayu. 2014 Jul-Sep;35(3):252-60.

   Punarnava Mandura may work as Rasayana in geriatric anemia by providing highly significant results on clinical features of Panduroga, Dehabala, Agnibala and Sattwa bala and by improving quality of life of patients of geriatric anemia.

3. Dr. D. Narapa Reddy et al., **Acute Toxicity study of Hamsa Mandoora and Vidangadi Loha in Wistar Albino rats**PIJAR; VOL-II/ISSUE -IV/March-April-2018

   At the oral dose level of 2000 mg/kg neither Hamsa Mandoora nor Vidangadi Loha produced observable toxic effects for hematological, biochemical or histological parameters. Even mortality is not caused at this dose. Lethal dose may be higher than the taken dose.

4. Akshatha et al. **Evaluation of Anti-Inflammatory activity of Takra Mandoora,** WJPPS, Vol 10, Issue 9, 2020

   By this study, we can understand the importance of bhavana dravyas used for mandura bhasma, and role of Takra as anupana in experimental models of anti-inflammation. So it can be concluded that Takra Mandoora is effective as shothagna specially in formalin induced model.

Vanga (Tin)

Synonyms

वङ्गञ्च वङ्गकं रङ्गं रङ्गकं शुक्रलोहकम्। कुरूप्यं त्रपुसञ्चैव त्रपुष त्रपु कीर्तितम्।। (R.T.8/1)

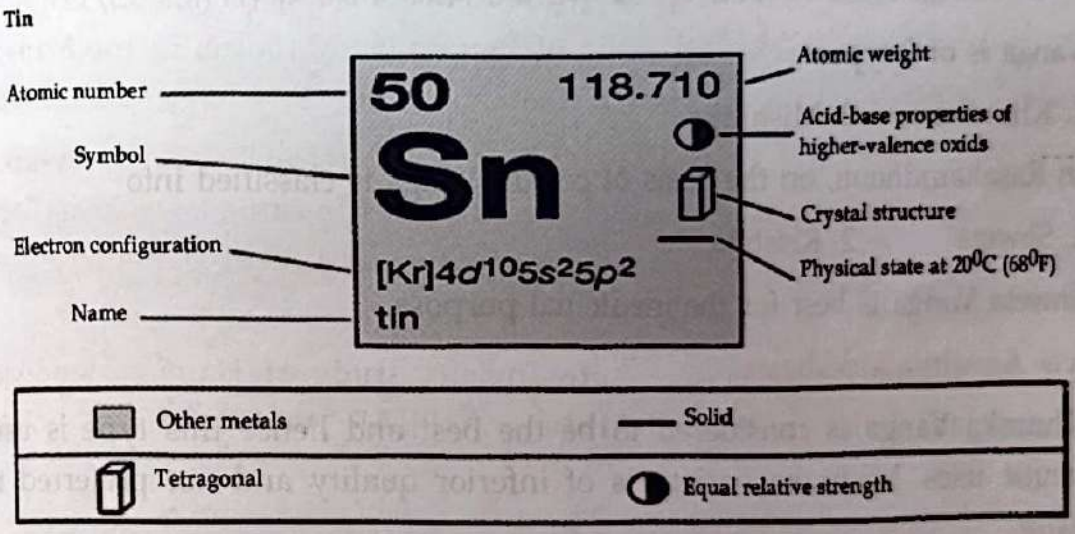
Vanga	Vangaka	Ranga	Rangaka	Shukraloha
Kurupyam	Trapusa	Trapusha	Trapu	Poothigandha
Mandukam	Madhuram	Himam	Picchata	Kutila
Simhala	Shwetam	Pushpam	Khuraka	Mishraka

Vernacular Names

Sanskrit - Vanga
English - Tin
Latin - Stannum
Hindi - Ranga
Kannada - Tavara
Symbol - Sn

Minerological Identification

The Latin name stannum originally meant an alloy of silver and lead, and came to mean 'tin' in the 4th century BC. Tin is the 49th most abundant element on Earth.



Properties

Chemical Symbol	Sn
Colour	Grayish white, Tin white
Luster	Metallic
Crystal habit	Granular- generally occurs as anhedral to subhedral crystals in matrix
Cleavage	Indistinct
Specific Gravity	7.31

Diaphaneity	Opaque
Hardness (Moh's Scale)	2
Fracture	Malleable
Streak	Gray white
Melting point	231.9°C
Boiling point	2602°C

Sources and Occurrence

Vanga is available in nature in compound form. Generally, Vanga is not found in native form. It is found only in the form of oxide known as tinstone. In India, it is found only in Bihar, Myanmar and Bangladesh.

In ancient times, Vanga was imported from Vangadesh (Bangladesh) so named as Vanga. Vanga was also found in Srilanka (Simhala region), that's why called Simhala. Other than these places, it is also found in China, Malaysia, Peru, Indonesia, Brazil, Bolivia, Russia, Thailand, Australia.

Types

खुरकं मिश्रकञ्चेति द्विविधं वङ्गमुच्यते। खुरं तत्र गुणैः श्रेष्ठं मिश्रकं न हितं मतम्।। (R.R.S.5/153)

Vanga is of 2 types:

1. Khuraka 2. Mishraka

In Rasakamdhenu, on the basis of colour, Vanga is classified into

1. Shweta 2. Krishna

Shweta Vanga is best for the medicinal purpose.

Grahya- Agrahya Lakshana

Khuraka Vanga is considered to be the best and hence this type is used for therapeutic uses. Mishraka variety is of inferior quality and not preferred to use internally.

धवलं मृदुलं स्निग्धं द्रुतद्रावं सगौरवम्। निःशब्दं खुरवङ्ग स्यान्मिश्रकं श्यामशुभ्रकम्।। (R.R.S. 5/154)

मृदुलं निर्मलञ्चैव चन्द्रलोहसमप्रभम्। द्रुतद्रावञ्च निःशब्दं खुरकं समुदीरितम्।। (R.T.18/3)

The characteristics of Khuraka vanga are:

1. Dhavala - white in color.
2. Mrudu - soft in touch.
3. Snigdha - slimy appearance.
4. Drutadravam - melts easily.
5. Sagouravam - heavy in weight.
6. Nishabdham - does not produce any sound.
7. Nirmala - clean.
8. Chandraloha Samaprabha- silver metal complexion.

CHAPTER EIGHT

द्रावेऽतिकठिनं रूक्षं त्वन्यधातुविमिश्रितम्। धूसरं कठिनञ्चैव मिश्रकं वङ्गमुच्यते।। (R.T.18/5)

The characteristics of Mishraka vanga are:

1. Drutae ati katinam - do not melts easily.
2. Ruksha - rough in touch.
3. Anya dhatu vimishram - mixed with other metals.
4. Dhusaram - dull black in color.
5. Katinam - hard in nature.

Ashuddha, Apakwa and Avidhee Sevanajanya Dosha

विशुद्धिहीनं खलु शुक्रलोहं निषेवितं वाप्यमृतं तु नूनम्।
निहन्ति सर्वां खलु कायकान्तिं कुष्ठं किलासञ्च परं विदध्यात्।।
गुल्मप्रमेहक्षयपाण्डुशोथश्लेष्मज्वरादींश्च भगन्दरञ्च।
शुक्राश्मरीं रक्तविकारजातान् रोगाननेकान् जनयेच्च नूनम्।। (R.T.18/6-7)

Improperly purified Vanga will causes:

1. Kaya kanti nasha
2. Kushta
3. Kilasa
4. Gulma
5. Prameha
6. Pandu
7. Shotha
8. Shleshmaja jwara
9. Bhagandhara
10. Shukrashmari
11. Rakta vikara

Shodhana

Vanga should subjected to samanya and Vishesha shodhana.

Samanya Shodhana

'तैले तक्रे गवां मूत्रे ह्यारनाले कुलत्थजे। क्रमान्निषेचयेत्तप्तं द्रावे द्रावे तु सप्तधा।
स्वर्णादिलोहपत्राणां शुद्धिरेषा प्रशस्यते'।। (R.R.S 5/13)

Vanga is to be heated till it melts and poured into Tilataila, Takra, Gomutra, Aranala, Kulattha Kwatha for 7 times in each liquid media successively.

Vishesha Shodhana

I Method

द्रावयित्वा निशायुक्ते क्षिप्तं निर्गुणिडकारसे। विशुध्यति त्रिवारेण खुरवङ्ग न संशयः।। (R.R.S.5/156)

Khuraka Vanga is melted by heating and poured throgh the Pitara yantra into the vessel containing Haridra choorna and Nirgundi swarasa for 3 times. This will certainly purifies the Khuraka Vanga.

वङ्गकं गालितं लोहदर्वीगतं सूर्यदुग्धे भृशञ्चैव निर्वापयेत्।
पूर्वमार्गेण वै शेषकर्माचरेत् सत्वरं वङ्गकं याति शुद्धिं पराम्।। (R.T.18/10)

Vanga is to be melted and poured through Pitara yantra into the vessel containing Arka dugdha. The solidified Vanga is collected back and the process of melting and pouring is repeated for 3 to 7 times.

S.No.	Drugs used	Method of Shodhana	Reference
1	Nirgundi swarasa and Haridra choorna	Dalana for 3 times	R.R.S.5/156
2	Arka dugdha	Dalana for 3-7 times	R.T.18/10
3	Churnodaka	Dalana for7 times	R.T.18/8
4	Kanjika	Dalana for 3-7 times	A.P.3/48
5	Amla Takra	Dalana for7 times	R.T.18/13

Jarana

Due to the low melting point of Puti lohas (Vanga, Naga and Yashada), they melts easily and does not convert to Bhasma form by Puta Paka. Jarana is performed by Avapa procedure. In this procedure, any other metal or any other substances like Apamarga, Ashwatha twak, Kukkutanda Twak Churna are added in the melted metal which is known as Avapa. Shuddha puti lohas after melting taken along with ¼th of churna in loha kadai and by giving teevragni, it is rubbed vigorously with the base of the loha darvi till it converts into powder form. This whole process is known as Jarana. The Jarita Vanga is subjected to the Bhasmikaran process for the preparation of Vanga Bhasma. The list of such drugs used in Jarana process are as below:

Herbal drugs	Minerals	Animals
Ashwatha (Ficus religiosa bark)	Parada (Mercury)	Mukta Shukti
Apamarga (Achyranthes aspera)	Makshika (pyrite)	Kukkutanda Twak
Arka (Calotropis gigantea)	Karpura	Shankha (Conch)
Babbula (Vachellia nilotica)	Abhraka (Mica)	Varatika
Chincha (Tamarindus indica)	Haratala (Orpiment)	
Bhallataka (Semecarpus anaacardium)	Manahshila (Realgar)	
Palasha (Butea monosperma)	Suryakshara	
Punarnava (Boerhavia diffusa)	Shilajatu (Butamen)	
Haridra (Curcuma longa)	Saindhava	
Jeeraka (Cuminum cyminum)	Tankana	
Snuhikshira (latex of Euphorbia neriifolia)		
Pippali (Piper longum)		

Marana

I Method

विशुद्धं वङ्गमादाय कटाहे गालयेद्भिषक्। पादांशिकं विशुद्धञ्च तत्र सूतं विनिक्षिपेत्।
दत्त्वा सम्मर्द्य यत्नेन द्रुतमेवावतारयेत् । वङ्गार्द्धं तालकं दत्त्वा खल्वे सम्पेषयेत्ततः।।
श्लक्ष्णचूर्णं ततः कृत्वा रविदुग्धेन मर्दयेत्। पिप्पलत्वक्समुत्थाच्छक्षारमध्यगतं भिषक्।
शरावसम्पुटे न्यस्य लावकाख्यपुटे पुटेत्। इत्थं पुटद्वयेनैव वङ्गं तु मृतिमाप्नुयात्।। (R.T. 18/25-28)

1 part of Shuddha Vanga is heated in the loha darvi till it melts and ¼th part of Shuddha Parada is added to melted Vanga, stirring well by heating intensively. Immediately the mixture is taken in Khalwa yantra and ½ part of Shuddha Haratala churna is added by triturating them thoroughly to obtain the powder form. Then the mixture is subjected to bhavana with Arkadugdha, chakrikas are prepared and dried.

In the sharava, half part of ash of Ashwattha twak is taken and chakrikas prepared are placed over it. Remaining half part of ash of Ashwattha twak is filled in the sharava and sandhibandana is done by placing another inverted sharava over it. This sharava samputa is subjected to Laghu puta. The same procedure is repeated to subject it for another laghu puta after which the vanga will become bhasma.

II Method

पलाशद्रवयुक्तेन वङ्गपत्रम् प्रलेपयेत्। तालेन पुटितं पश्चान्म्रियते नात्र संशयः।। (R.R.S.5/161)

Paste prepared of Haratala and Palasha drava is smeared over the Vangapatras, dried and these patras are confined in the sharava samputa. This is subjected to puta (3-4 Laghu puta), which will make the Vanga bhasma undoubtedly.

S.No	Drugs used	No. and Type of Puta	Reference
1	Vanga- 1 part; Parada- ¼th part; Haratala- ½ part; Arkadugdha- bhavana	2 puta (Laghu puta) placing chakrikas in the midst of Ashwattha twak bhasma inside the sharava	R.T. 18/15-18
2	Haratala and Palasha drava lepa over Vanga patras	3-4 Laghu puta	R.R.S.5/161
3	Bhallataka taila lepa over Vanga patras	Heated with the firewoods of Chincha, Ashwattha and Palasha	R.R.S.5/162
4	Vanga, Haratala Arka dugdha bhavana	7 puta (Kukkuta puta) placing chakrikas in the midst of Ashwat-thatwak bhasma inside the sharava	A.P.3/170

Probable Physico-chemical changes during above processing

During Vanga Shodhana by Dalana method, vanga will be melted and poured in

liquids like Churnodaka. Bumping of the melted Vanga (Tin) can be observed during Shodhana, it may be due to sudden reduction in the inter molecular space of the molten metal or due to sudden fall in the temperature from 245 °C to 45°C. The process may lead to the formation of coarse grain structure of the metal, which is more brittle in nature than the original form. Thus it may be one of the main reason in the transformation of some part of Vanga to coarse powder form. The pH of Churnodaka was detected to be highly alkaline i.e. 13. Thus repeated heating and quenching of the metal in the basic liquid media may lead to corrosive changes in the metal and also may be utilized for the removal of alkaline soluble impurities from the metal. Volatile impurities may also be evaporated during the procedure.

During Jarana process, due to continuous rubbing, more surface area of the metal is exposed to the air, which may facilitate to concerned compound formation and gradually the metal converted to powder form. According to literatures, Apamarga panchanga is a good Maraka Dravya (combustible material) for Vanga. Tin will oxidize quickly when treated with alkali in presence of heat and open atmosphere. An overall review of the herbal drugs used for Vanga Marana indicates that most of them contain Kshara (Alkaline matter). Kshara may be worked as a catalyst and convert the metal into powder form. By its Bhedana (penetration) property, Kshara may helps in making the metal softer and brittle. Presence of Chloride ions in the Apamarga may provide for Chloridization of the metal. During the red hot stage, powder was covered with an earthen saucer plate. This leads to create an environment devoid of air specially oxygen and then heat up to red hot stage. These all may be compared with the process of calcination, in which the metal is allowed to undergo decomposition without melting. The free metallic tin which is still present after Jarana process will be completely turned into SnO compound form during Marana.

Properties and Therapeutic Uses

वङ्ग तिक्तोष्णकं रूक्षमीषद्वातप्रकोपनम्। मेहश्लेष्मामयघ्नं च मेदोघ्नं कृमिनाशनम्।। (R.R.S. 5/155)

Rasa	Tikta, Amla, Katu, Kashaya, Kinchith lavana
Guna	Laghu, Sara, Ruksha, Ushna, Tikshna
Veerya	Ushna
Vipaka	Katu
Doshaghnata	Kapha Pitta hara
Karma	Medohara, Ruchikara, Lekhana, Vrushya, Dhatusthoulyakara, Varnya, Chakshushya, Deepana, Pachana, Balya, Krimigna, Medhya, Rasayana, Prajajanaka, Ayushya, Shaktiprada, Pushtikara, Dahahara, Vishahara, Bruhmana.

Prayoga	Admana, Agnimandya, Pandu, Kasa, Shwasa, Meha, Vrana, Kshaya, Vanti, Visha, Swapna dhosha, Kasa, Grahani, Gulma, Udara, Shwetha pradara, Moha, Krimi, Medoroga, Daha, Shotha, Ratri sweda, Jararoga, Mutra krucchra, Upadamsha, Ojomeha, Garbhashaya chyuthi.

Dose

रक्तिकातः समारभ्य रक्तिद्वितयसंमिताम्। पूर्णमात्रां प्रयुञ्जीत मृतवङ्गस्य कोविदः॥ (R.T.18/46)

1 to 2 Ratti (125-250 mg).

Anupana

Ghee, Honey, Milk, Butter, Roganusara Swarasa/kwatha.

Management of Ashuddha, Apakwa and Avidhee Sevanajanya Dosha

'मेषशृङ्गीसितायुक्तां यः सेवेत दिनत्रयम्। वङ्गदोषविमुक्तोऽसौ सुखं जीवति मानवः'॥ (B.R.R.S)

Mesha shrungi and Sita are to be taken for three days to pacify the ashuddha Vanga sevana janya vikaras.

Important Formulations

1. Yogeshvara rasa
2. Talakeshwara rasa
3. Trinetra rasa
4. Trivanga bhasma
5. Nityananda rasa
6. Svarna Vanga
7. Somanatha rasa
8. Maha sleshmakalanala rasa
9. Indu vati
10. Talakodaya malahar

Research Updates

1. Dr. Rudramma Hiremath et al, **Vanga Bhasma And Its XRD Analysis;** Ancient Science of Life, Vol. 29, No.4 (2010) Pages 24 -28

   Study showed that, significant structural or chemical changes may not occur during Shodhana process. Jarana process which is pre stage of Marana suggests that, the compound or product obtained by heating and processing Vanga with Apamarga leads to a mixture of SnO (tin dioxide), Sn (tin), KSnO (potassium tin dioxide) seen in XRD analysis. Vanga Bhasma formed by processing Jarita Vanga with Kumari (Aloe vera) gives the compounds SnO (tin dioxide), 2 KSnO (potassium tin dioxide). The free metallic tin which was seen in Jarita sample was completely turned into compound form during Marana procedure. Hence it was not seen in XRD analysis of Vanga Bhasma sample

2. Vd. Raman Belge et al, **Analytical and antimicrobial study of Vanga Bhasma with special reference to Ayurveda Prakasha,** JAIMS; 2021;2:33-43.

   Formation of the small sized particles as small as a nano-particle was confirmed by SEM study. The colour variation could be due to heat offered during the processes

as well as the quality of the raw material. XRD study confirms that Tin oxide is the major compound found in all the Vanga Bhasma samples. VB (Ref. Ayurved Prakash 3/170) is an antimicrobial drug and is useful in inhibiting the growth of Candida Albicans, Klebsiella Pneumoniae, Staphylococcus Aureus, E.Coli and Bacillus Subtilis in their decreasing order with a concentration of 100 mg/ml. This outcome further supports the Krumighna and Jantughna properties (Anti-microbial activity) of Vanga Bhasma.

3 Jamadagni PS et al, **Repeated dose oral toxicity of Trivanga Bhasma in Swiss albino mice.** Ayu. 2013 Jan;34(1):118-23

Trivanga Bhasma contains heavy metals lead (31.67%), tin (38.36%), and zinc (17.1%) and is prepared in compliance with Ayurvedic classical literature. However, no treatment-related effect was observed up to 10 times therapeutic dose levels. Present study indicates 78 mg/kg body weight as NOEL for Trivanga Bhasma in Swiss albino mice. Body weight change is an important index of assessment of toxicity. In this study; the test drug even at the highest dose level studied showed normal weight gain. This indicates the drug has not caused any adverse effect on normal physiological functions of the body. Histopathological evaluation also indicated normal cyto-architecture and hence, it is concluded that Trivanga Bhasma is safe at dose rate of 78 mg/kg.

4. Dr. Vijendra. P, **Analytical study of Svarnavanga and it's Therapeutic efficacy in Oligozoospermia**- PG dissertation, Rajiv Gandhi University of Health Sciences (India)

The analytical study infers that Svarna vanga is a good antioxidant. Svarna vanga was in tin sulphide form. Clinical study shows that Svarna vanga is effective in improving sperm count. Svarna vanga is also found effective in sperm motility as well as increasing semen volume.

CHAPTER EIGHT

Naga (Lead)

Synonyms

सीसकं शीषकं सीसं नागकं नागनामकम्।
कुवङ्गकं कुरङ्गञ्च तथा सिन्दूरकारणम्।। (R.T.19/1)

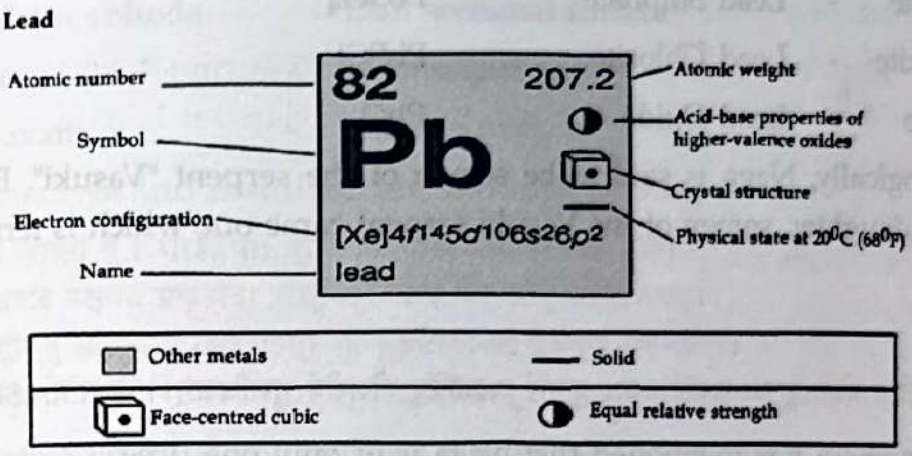
Seesaka	Sheeshaka	Seesam	Nagakam	Naga
Kuvanka	Kuranga	Sindurakarana	Kutila	Ahi
Pannaga	Phani	Kari	Uraga	Bhujanga
Jada	Shita	Yavaneshta	Yogishta	Paripishta
Vadhra				

Vernacular Names

Sanskrit	-	Naga	English	-	Lead
Hindi	-	Seesa	Kannada	-	Seesa
Latin	-	Plumbum	Symbol	-	Pb

Minerological Identification

It was one of the first metals mined in North America. One of the oldest metal used by man.



Properties

Chemical Symbol	Pb
Colour	Lead Gray
Luster	Metallic
Crystal habit	Blocky- Crystal shape tends to be equant
Cleavage	None
Specific Gravity	11.37
Diaphaneity	Opaque
Hardness (Moh's Scale)	1.5
Fracture	Hackly
Streak	Gray
Melting point	327.5°C
Boiling point	1749°C

Sources and Occurrence

Native Naga is referred to be available in India viz. Kashmir, Punjab, Rajasthan, Andhra Pradesh [Karnool dist], Simhabhoomi and Hazaribaug district of Bihar and other than India it is also available in Australia, America, Mexico and Burma.

Metallic lead does occur in nature, but it is rare. It is found in ore with zinc, silver and copper, and is extracted together with these metals. It is obtained from 3 main countries- Australia, China and US. In India, lead is smelted from mines situated at Udaipur, Bihar and Andhra Pradesha.

Main Ores of Lead are

- Galena - Lead Sulphide - PbS
- Cerrusite - Lead Carbonate - $PbCO_3$
- Anglesite - Lead Sulphate - $PbSO_4$
- Matlockite - Lead Chlorite - PbFCl
- Litharge - Lead Oxide - PbO

Mythologically, Naga is said to be semen of the serpent "Vasuki". By looking at king Bhogi's daughter, semen of the Vasuki serpent came out, which is termed as Naga or Seesa.

Types

नागं च द्विविधं प्रोक्तं कुमारं समलं तथा। कुमारं रसकार्येषु योजनीयं गुणधिकम्।। (B.R.RA.SU.)

Rasarnavakara has mentioned that Naga is of only one type.

Other Acharyas have mentioned two types.

1. Kumara- Good for Rasakarma & therapeutic purpose.
2. Samala- Considered as inferior.

Grahya Lakshana

द्रुतद्रावं महाभारं छेदे कृष्णसमुज्ज्वलम्। पूतिगन्धं बहिः कृष्णं शुद्धं सीसमतोऽन्यथा।। (R.R.S.5/170)

सुगौरवं मृदु स्निग्धं छेदने मलिनोज्ज्वलम्। बहिः श्यामं द्रुतद्रावं सीसकं जात्यमादिशेत्।। (R.T. 19/2)

The characteristic features of the genuine Naga are:

1. Guru/Gaurava - Heavy.
2. Dhrutadravam - Melts quickly on heating.
3. Mahabharam - Weighs heavy.
4. Chhede krishnam - Black color when cut.
5. Chede samujvalum - Glitters when cut.
6. Pootigandham - Emits characteristic bad odour while heating.
7. Bhahikrishnam - Externally blackish.
8. Mridu - Soft.
9. Snigdha - Slimy.
10. Chedane malinojjvalam - Presents a black and bright sectional surface.

Agrahya Lakshana

बहिः शुक्लं भारहीनं रूक्षं छेदे च निष्प्रभम्।
समलं कठिनद्रावं सीसकं हेयमादिशेत्।। (R.T.19/3)

Naga having following characteristics should be rejected:

1. Bahihshuklam - Whitish outer surface.
2. Bharahinam - Light weight.
3. Ruksha - Rough surface.
4. Nishprabham chhede - Dull sectional surface.
5. Samalam - With impurities.
6. Katinadravam - Hard to melt.

Ashuddha, Apakwa and Avidhee Sevanajanya Dosha

सीसं निहन्ति विमलां तु शरीरशोभां। कुष्ठं किलासकमलं जनयेच्च नूनम्।
सन्धीन् प्रपीड़यति पक्षवधं प्रकुर्यात्। संशुद्धिहीनस्त्रिह चेत् खलु मारितं स्यात्।।
शुद्धिपाकविहीनन्तु सीसकं परिशीलितम्। गुल्मं प्रमेहमानाहं श्वयथुञ्च भगन्दरम्।।
वह्निमान्द्यं त्वंसशोथं बाह्वोर्निश्चेष्टतां तथा। शूलं क्षयादिकान् रोगान् जनयत्यविकल्पतः।। (R.T.19/4-6)

Naga Bhasma which is not properly purified and incinerated causes:

1. Kushta	6. Gulma	11. Agnimandya
2. Kilasa	7. Prameha	12. Shotha
3. Kamala	8. Anaha	13. Kshaya
4. Sandhishula	9. Svayathu	
5. Pakshavadha	10. Bhagandara	

Shodhana

Naga should subjected to samanya and Vishesha shodhana.

Samanya Shodhana

'तैले तक्रे गवां मूत्रे ह्यारनाले कुलत्थजे। क्रमान्निषेचयेत्तप्तं द्रावे द्रावे तु सप्तधा।
स्वर्णादिलोहपत्राणां शुद्धिरेषा प्रशस्यते'।। (R.R.S 5/13)

Naga is to be heated till it melts and poured into Tilataila, Takra Gomutra, Aranala, Kulattha Kwatha for 7 times in each liquid media successively.

According to Acharya Madhava of Ayurveda prakasha, Samanya Shodhana of Dhatus said to be carried by heating and dipping them in Swarasa of Kadalimula.

Vishesha Shodhana

I Method

सिन्धुवारजटाकौन्तीहरिद्राचूर्णकं क्षिपेत्। द्रुते नागेऽथ निर्गुण्ड्यास्त्रिवारं निक्षिपेद्रसे।। (R.R.S.5/172)

Naga is to be melted and poured through the hole of Pithara yantra into the vessel containing Nirgundi swarasa mixed with Nirgundi moola twak churna, Renuka beeja churna and Haridra Churna for 3 times.

II. Method

सीसकं द्रावयेल्लोहदर्वीगतं स्वच्छचूर्णादिके चाथ निर्वापयेत्।
पूर्वमार्गेण वै शेषकर्माचरेत् सीसकं सत्वरं याति शुद्धि पराम्।। (R.T.19/10)

Naga is melted in Loha darvi and poured through the Pitara yantra into the vessel containing clean Choornadhaka for seven times.

S.No	Drugs used	Method of Shodhana	Reference
1	Nirgundi swarasa with Nirgundi moola twak churna, Renuka beeja churna and Haridra Churna	Dalana for 3 times	R.R.S.5/172
2	Choornadhaka	Dalana for 7 times	R.T.19/10
3	Nirgundi mula twak swarasa	Dalana for7 times	R.T.19/7-9

Marana

Two steps involved in preparation of Naga bhasma– 1. Jarana, 2. Marana

1. Jarana

Naga is melted in iron pan and equal quantity of Aswattha bark ash is added little by little by rubbing with the bottom of iron ladle. When complete Naga convert into powder form, it is collected at the middle of pan, covered with earthen plate & strong heat is given till it becomes red hot. On cooling powder is washed to clear alkalinity.

2. Marana

I Method: (R.T. 19/24-28)

Shuddha Naga is melted and equal part of Apamarga Churna and Vasa Churna are added to it, rubbed with Vasa stick until Naga becomes Bhasma/powder form, then it is washed with water to remove Kshara. To this, equal parts of Manashila is to be added and ground with Vasa swarasa. Later subjected to 3 Putas (Kukkuta puta).

II Method: (R.T. 19/29-33)

Shuddha Naga is to be melted by heating it intensively and equal quantity of Shuddha Parada is to be added, immediately rubbed vigorously in khalwa yantra. Then it is to be taken in Khalwa and Mardana is to be done with Amla drava, washed with water and dried. For this ksharamukta churna, double quantity of Shuddha Gandhaka Churna, is added and Mardana has to be done for 6 hours to prepare a kajjali. This Kajjali is taken in Sharava Samputa and subjected to Laghuputa.

III. Method: Shasti Puta Naga Bhasma

अश्वत्थचिञ्चत्वग्भस्म नागस्य चतुरंशतः। क्षिपेन्नागं पचेत्पात्रे चालयेल्लोहचाटुना ।।
यावद्भस्म तदुद्धृत्य भस्मतुल्या मनःशिला। जम्बीरैरारनालैर्वा पिष्ट्वा रुध्वा पुटे पचेत्।।
स्वाङ्गंशीतं पुनः पिष्ट्वा विंशत्यंशशिलायुतम्। अम्लेनैव तु यामैकं पूर्ववत्पाचयेत्पुटे।।
एवं षष्टिपुटैः पक्को नागः स्यात्सुनिरुत्थकः।। (R.R.S.5/181-183)

In an Iron Vessel, Shuddha Naga is to be heated and melted. To this ¼th part of Ashwatha Churna and Chincha twak Churna are added and rubbed continuously for 3 hours to make it to powder form. To this obtained fine powder of Naga, same quantity of Manashila is added and grounded with the Jambeera rasa and Kanji and subjected to 60 putas. From 2nd puta onwards, ½0th part of Manashila is to be added and then subjected to puta after triturating with Kanji or Amla drava. Such 60 putas will yield a good quality Nagabhasma.

S.No	Drugs used	No. and Type of Puta	Reference
1	Apamarga Churna and Vasa Churna Manashila; Vasa swarasa bhavana	Jarana 3 Putas (Kukkuta puta)	R.T. 19/24-28
2	Shuddha Parada; Nimbu swarasa or Kanji bhavana; Shuddha Gandaka- Mardana	Laghu puta	R.T. 19/29-33
3	Ashwata Churna and Chinchatwak Churna - ¼th part Manashila; Jambeera rasa and Kanji-bhavana	Jarana 60 putas	R.R.S.5/181-183
4	Apamarga Churna, Vasa Churna and Ashwattha churna Shuddha Haratala - ½ part	Jarana 3 Putas (Laghu puta)	R.T. 19/34-36
5	Shuddha Manashila and Shuddha Gandhaka Nimbu swarasa- bhavana	3 Putas (Kukkuta puta)	R.T. 19/19-23

Probable Physico-chemical changes during above processing

Dhalana method of shodhana is used for Naga, as it is having low melting point. When any substance is heated its molecule get energy and expansion taken place, when this expansion is more than certain limit, phase changes may take place. In Dhalana, Naga is heated till its melting and then suddenly poured in to liquid media, where metals is exposed to lower temperature below its melting point, so Naga further resume solid state. In between it is possible that some liquid media trapped between Naga during solidification. We also assume that undesired substances which present either outer surface and in between Naga particle may react with liquid media and separated

from it either in the form of soluble material or new compound which is easily detached and trapped substances between the metals may be beneficial.

Jarana comprise strong heating in open iron pan and thus creates oxide form of metal with mixture of organic ash. During Marana, Naga easily make amalgam with Parada and while incineration, Parada also help in disintegrating Naga particles into finest form. Parada qualities of Yogavahi (carrier of therapeutic properties) and Rasayana (rejuvenation) property will be imbibed to Naga bhasma.

Properties and Therapeutic Uses

अत्युष्णं सीसकं स्निग्धं तिक्तं वातकफापहम्।
प्रमेहतोयदोषघ्नं दीपनं चाऽऽमवातनुत्।। (R.R.S. 5/171)

Rasa	Tikta, Katu, Madhura
Guna	Ushna, Guru, Sara, Snigdha
Veerya	Ushna
Vipaka	Katu
Doshaghnata	Tridoshaghna
Karma	Deepana, Chakshushya, Medoghna, Viryadardhyakara, Ruchivardhaka, Kamavardhaka, Lekhana, Rasayana, Vajikara, Shukrala,Vrushya, Krimighna, Ayushya, Kantivardhaka, Rajataranjaka.
Prayoga	Kapha roga, Mutra roga, Shwasa, Kasa, Pandu, Shotha, Grahani, Amadosa, Agnimandya, Mandalakushtha, Gara, Krimi, Pipasa, Visha, Hridroga, Pandu, Meha, Trishna, Amavata, Ruja, Sarvaroga, Shula, Arsha, Kushtha, Grahani, Gulma, Shosha, Vrana, Kshaya, Bhrama, Kasa, Shiroroga, Netraroga, Shukradosha, Pralapa, Daha, Raktapradara, Antrashotha, Akshepa, Sangrahani, Atisara, Dhatukshaya, Yakruthvikara.

Dose

पादांशतो रक्तिकाया रक्तिकैकमितं शुभम्। मृतं सीसं प्रयुञ्जीत बलकालाद्यपेक्षया।। (R.T.19/46)

¼th - 1 Ratti (31- 125 mg)

Anupana

Madhu and Roganusara Swarasa or kwatha

Management of Ashuddha, Apakwa and Avidhee Sevanajanya Dosha

हेमं हरीतकीं सेवेत् सितायुक्तं दिनत्रयम्। अपक्वनागदोषेण विमुक्तः सुखमेधते।। (B.R.R.S)

Swarnabhasma, Haritaki Choorna and Sita are to be taken for three days to overcome the Naga ashudha sevanajanya vikaras.

अविशुद्धामृताह्युत्थविकारपरिशान्तये। विशुद्धगन्धं चूर्णन्तु योजयेद् भिषजां वरः।। (R.T.19/93)

If any untoward effects observed by the improperly processed Naga, then Shuddha Gandaka is administered to pacify the symptoms.

Important Formulations

1. Trivanga bhasma
2. Trilokya chintamani rasa
3. Antrashoshantaka rasa
4. Ratnagarbha pottali rasa
5. Kalanala rasa
6. Jwarari rasa
7. Kshayakesari rasa
8. Yogeshwara rasa
9. Suchikabharana rasa
10. Manikya rasa

Research Updates

1. Rajput Dhirajsingh S et al; **Experimental study on effect of Naga Bhasma (lead calx) on hematological and biochemical parameters.** Journal of Indian System of Medicine 7(1):p 8-19, Jan–Mar 2019.

   The findings of hematological parameters presented major changes in MCV, MCH, and MCHC by NBH-treated group, whereas in biochemical parameters, both test drugs significantly affected BSL, SGOT, and serum ALP activity. Thus, *Naga Bhasma* prepared in seven incineration cycles by *Parada* media was found to be better than *Vasa Swarasa* media. However, both test drugs were not found completely safe, especially at higher dosage where changes related to renal and hepatic dysfunctions were found in hematological and biochemical analysis. Therefore, *Naga Bhasma* prepared in less number of incineration cycles is not therapeutically recommendable.

2. S. P. Pandey et al, **Comparison of the Toxicological effect of Lead-based Herbo-Mineral preparations and their corresponding Metal Nano-Particle on enzymatic activity and growth of Baker's yeast,** IJPSR, 2019;Vol.10(10): 4451-4461

   The results of the study reveal that shodhana process significantly effects to the physicochemical character of the metallic preparation and presence of heavy metals like lead effects to the activity of enzymes and growth pattern of the yeast and can successfully be used for the in-vitro toxicity studies

3. Kavita Hulmani, **Analytical and Clinical study of Nagabhasma with special reference to its Hypoglycemic effect in Madhumeha.-** "- PG dissertation (2004), Rajiv Gandhi University of Health Sciences (India)

   The Quantitative Analysis of Nagabhasma reveals the mass concentration of Lead as Lead oxide from 78.8%. The experimental study reveals absolutely No toxicity of Nagabhasma. Naga bhasma along with diet control & proper exercise shows significant reduction in blood glucose levels and absence of glucose in urine along with the symptoms like Prabhootamootrata, Trishnadikya, Kshudadikya and Padadaha

4. Dheeraj Sharma et al., **Nagasutra an effective and advance alternate of Ksharasutra for the treatment of Anorectal disorders: A hypothetical explication based on ancient ayurvedic treatise**, IJUIM; 2021; 5(2): 101-104

If Nagasutra is used instead of Kshatrasutra, it can prove to be even more useful. The Dravya used in the preparation of Nagasutra increase its usefulness even more. From the above hypothetical view and classical references it can be assumed that Nagasutra will be more effective in the treatment of anorectal disorders if used in place of Ksharasutra.

Yashada (Zinc)

Synonyms

यशदं यसदञ्चैव जशदं जसदं तथा। रीतिहेतुः खर्परजं समाख्यातं भिषग्वरैः।। (R.T.19/94)

Yashada	Yasada	Jashada	Jasada	Ritihetu
Kharparajam	Rangasankash	Kharparasatwaka	Girija	

Vernacular Names

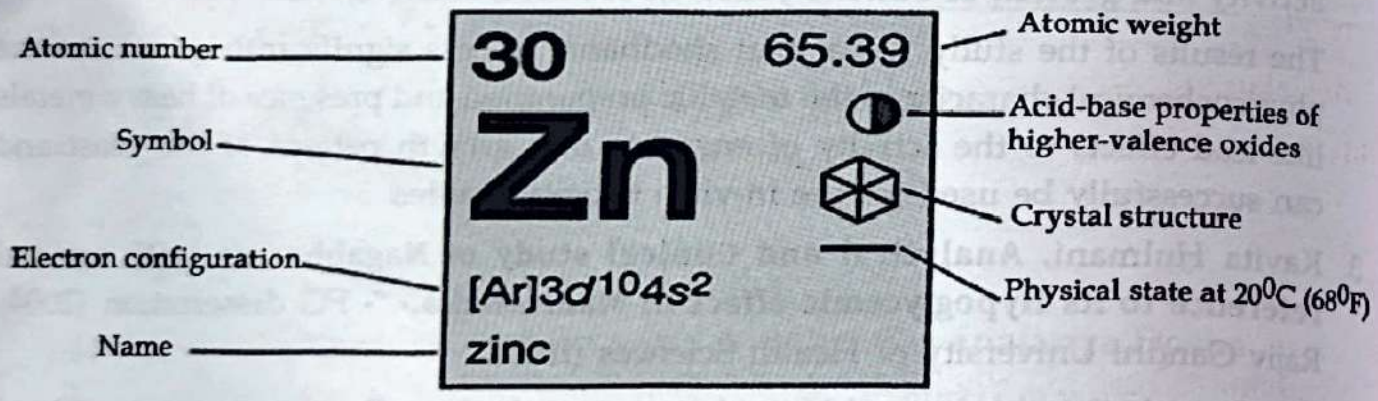
Sanskrit	-	Yashada	English	-	Zinc
Hindi	-	Jasta	Kannada	-	Sattu
Latin	-	Zincum	Symbol	-	Zn

CHAPTER EIGHT

Minerological Identification

Zinc (German: Zink), also known as spelter, is a metallic chemical element. It is one among the essential trace element for human nutrition and widely used for making alloys.

Zinc



Properties

Chemical Symbol	Zn
Colour	Blue gray
Luster	Metallic
Crystal habit	Irregular grains- occurs as splotchy, anhedral crystals
Cleavage	Perfect
Specific Gravity	6.9-7.2
Diaphaneity	Opaque
Hardness (Moh's Scale)	2
Fracture	Brittle/Hackly
Streak	Light gray
Melting point	419.5°C
Boiling point	907°C

Sources and Occurrence

Zinc does not occur in the native form since it is a reactive metal. However, in the combined state, zinc is widely distributed. Zinc makes up about 75 ppm (0.0075%) of the Earth's crust and 24th most abundant element. The main zinc mining areas are Canada, Russia, Australia, USA and Peru. In India large deposits of zinc blende occur in Zawar mines near Udaipur in Rajasthan. Zinc ores are also available in Burma, Punjab, Shimla, Bengal, Chennai, Udaipur, Jodhpur and Deharadun.

Important Ores of Zinc

The important ores of zinc are

i) Zinc blende, ZnS

ii) Calamine, $ZnCO_3$

iii) Zincite, ZnO

Other important zinc ores are wurzite, smithsonite and hemimorphite.

Grahya Lakshana

छेदे समुज्ज्वलं स्निग्धं मृदुलं निर्मलं तथा। द्रुतद्रावं महाभारं यशदं ग्राह्यमुच्यते।। (R.T.19/95)

Genuine Yashada should have following characteristics:

1. Chhede Samujjwala - Uniformly glistening on Cutting.
2. Snigdha - Unctous,
3. Mrdula - Soft and malleable on pressure.
4. Nirmala - Clean.

5. Dritadrava - Melts very quickly.
6. Mahabhara - Appearing light but heavy.

Agrahya Lakshana

कठिनं कठिनद्रावं रूक्षं रूक्षप्रभं लघु। मलिनं यशदं यत्तु तदग्राह्यं प्रकीर्तितम्।। (R.T.19/96)

Yashada having following characteristics is not acceptable one:

1. Katina - Hard
2. Katinadrava - Melts with difficultly
3. Ruksa - Dry/roughened surface
4. Ruksaprabha - Dull lustre
5. Laghu - Light
6. Malina - Dirty

Ashuddha, Apakwa and Avidhee Sevanajanya Dosha

विशुद्धिहीनं यशदं मृतञ्चेद् विशोधितं वाप्यमृतं त्वविज्ञैः।
निषेवितं वै जनयेद् विकारान् गुल्मप्रमेहक्षयकुष्ठकादीन्।। (A.P.3/97)

Yashada should be purified before subjecting it to marana. Other wise it will produce the disease like:

1. Gulma
2. Prameha
3. Kshaya
4. Kustadi roga

Shodhana

Yashada should subjected to samanya and Vishesha shodhana.

Samanya Shodhana

'तैले तक्रे गवां मूत्रे ह्यारनाले कुलत्थजे। क्रमान्निषेचयेत्तप्तं द्रावे द्रावे तु सप्तधा।
स्वर्णादिलोहपत्राणां शुद्धिरेषा प्रशस्यते'।। (R.R.S 5/13)

Thin sheets of Yashada is to be heated till its melts on the flame and Poured into Tilataila, Takra, Gomutra, Aranala, Kulattha Kwatha for 7 times in each liquid media successively.

Vishesha Shodhana

According to Ayurveda prakasha (A.P.3/182), the method of Shodhana and marana of Yashada is same as that of Vanga. Other specific method of shodhana told by other Acharyas are as below:

I Method

जात्यं यशदमादाय लोहदर्व्यान्तु विन्यसेत्। तीव्राग्निना तु विद्राव्य चूर्णवारिप्रपूरिते।।
सच्छिद्रेण पिधानेन पिहितास्ये घटे क्षिपेत्। सप्तवारं प्रयत्नेन यशदं शुद्धिमाप्नुयात्।। (R.T. 19/98-99)

Genuine Yashada is taken in Loha darvi and heated in intense heat till it melts. Melted Yashada is poured into the Churnodaka taken in vessel which is closed with pitara yantra, the lid having a hole at the center through which the melted Yashada is poured ino the pot. This process is repeated for 7 times to purify the Yashada.

II Method

यशदं द्रावितं यत्नात् सप्तवारं विधानतः। सिन्दुवारशिफाद्रावे स्नपयेद्भिषजां वरः॥ (R.T. 19/100)

Yashada is heated in loha darvi till it melts and poured through the pitarayantra into the vessel containing Nirgundi swarasa. This process is repeated for 7 times to make the Yashada shuddha.

S.No.	Drugs used	Method of Shodhana	Reference
1	Churnodaka	Dalana for 7 times	R.R.S.3/20
2	Nirgundi swarasa	Dalana for 7 times	R.R.S.3/23
3	Godugdha	Dalana for 21 times	R.T.19/102
4	Snuhi Ksheera	Dalana for 21 times	R.T.19/10

Marana

I Method : R.T.19/104-107

Shuddha Yashada is heated intensively till it melts and immediately it is poured into Khalwa yantra and triturated with equal quantity of Shuddha Parada. This mixture is washed with the nimbu swarasa and dried. Later Shuddha Gandaka equal to the quantity of Yashada is added and triturated to form homogenous mixture. This mixture is enclosed in sharava samputa and subjected to puta (laghu puta). This process will incinerate Yashada and the bhasma obtained can be used for all therapeutic purposes.

II Method : R.T.19/108-111

Shuddha Yashada is heated intensively till it melts and the heating is continued by rubbing vigorously with the strong stick of neem tree till Yashada attains powder form. This powder is triturated with the ¼ part of the Shuddha Haratala powder in the khalwa yantra till it becomes homogenous mixture. This mixture is enclosed in sharava samputa and subjected to puta (laghu puta). This process will incinerate Yashada and the bhasma obtained can be used in different diseases using suitable different anupanas.

S.No	Drugs used	No. and Type of Puta	Reference
1	Shuddha Parada and Shuddha Gandaka nimbu rasa for washing	Laghu puta	R.T.19/104-107
2	Shuddha Yashada- 1 part, rubbed with nimba danda Shuddha Haratala-¼ part	Jarana Laghu puta	R.T.19/108-111
3	Shuddha Yashada, Apamarga churna	Jarana and powder is heated till it attains angara varna	R.T.19/112-115

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Probable Physico-chemical changes during above processing

Yashada bhasma can been prepared by three step process i.e. Shodhana, Jarana and Marana. During Shodhana process, for repeated heating and quenching of the zinc metal, different acidic and basic liquid media are used. The alternative melting and quenching of zinc metal in these liquid media not only deforms their external surface but also change the chemical and physical nature of metal. Thus during the shodhana process, metal may get free from impurities and change into blackish and coarse powdered form, due to partial oxidation of zinc during the melting process. During Jarana process, the Shodhita sample will be heated with Apamarga churna in an iron pan for 5–6 hours at 600°C, which creates oxide form of metal with mixture of organic ash. During Marana process, Zinc will be converted into oxide form.

Properties and Therapeutic Uses

यशदं तुवरं शिशिरं कटुकं परमं नयनामयनाशकरम्।
कफपित्तसमुत्थितरोगहरं बलवीर्यविवेकसमृद्धिकरम्।।
यशदं पाण्डुशमनं बहुमेहनिषूदनम्। कासश्वासप्रशमनं निशास्वेदनिबर्हणम्।।
यशदं परमं श्लेष्मकलासंकोचकृन्मतम्। समाख्यातं विशेषेण व्रणसंस्रावरोधनम्।। (R.R.S.3/16)

Rasa	Kashaya, Tikta
Guna	Sheeta
Veerya	Sheeta
Vipaka	Katu
Doshaghnata	Kaphapittahara
Karma	Chakshushya, increases Bala-Veerya-Viveka, Shlesmakala sankochaka, Vrana srava rodhaka
Prayoga	Netraroga, Meha, Pandu, Kasa, Shwasa, Ratri sweda

Dose

गुञ्जार्द्धतः समारभ्य गुञ्जैकप्रमितं मृतम्। यशदं विनियुञ्जजीत बलकालाद्यपेक्षया।। (R.T.19/125)

½ gunja - 1 gunja (62-125 mg)

Anupana

Puranaghrita, Tambula, Kharjura tandula hima, Sharkarajaji samyukta.

Management of Ashuddha, Apakwa and Avidhee Sevanajanya Dosha

बलाभया सितायुक्तां सेवते यो दिनत्रयम्।
यशदस्य विकारस्तु शान्तिमायाति नान्यथा।। (B.R.R.S)

If any untoward effect observed by the ingestion of Yashada bhasma, the person should be administered with Bala and Haritaki churna along with sugar for 3 days.

Important Formulations

1. Trivanga bhasma
2. Laghu vasanta malathi rasa
3. Yashadamrita malahara
4. Suvarna vasanta malathi rasa
5. Shilajatwadi loha

Research Updates

1. Pareek A et al, **Physico-chemical characterization of traditionally prepared Yashada bhasma;J** Ayurveda Integr Med. 2020 Jul-Sep;11(3):228-235

   The XRD analysis of *Yashada bhasma* shows hexagonal ZnO crystalline phase whereas the raw metal confirms the presence of crystallite Zinc metal. DLS shows reduction in particle size of *Yashada Bhasma* (339.8 nm) as compared to raw metal (2063 nm) and this reduction is further supported by SEM which shows the particle size of *Yashada bhasma* (324 nm) and raw metal (1-2μ). The zeta potential value confirms the stability of *Yashada bhasma*. EDAX revealed difference in concentration of Zinc and Oxygen in both the samples.

2. Dr Mahammad Gous S Doddamani, **Observational study on the Preparation, Physico-Chemical evaluation of Jasada bhasma and its Hypoglycemic effect in Madhumeha.**- PG dissertation, Rajiv Gandhi University of Health Sciences (India)

   In Analytical study, It was observed that Jasada bhasma was oxide of zinc with traces of Fe,O,-6.20%, Chloride-0.15%, Alluminium-0.86%, Ashvalue-99.50%, Acid insoluble ash-2.06%, converted to phosphate 0.10% and sulphate 1.16% w/w.

   In clinical study, It was seen that there was definite hypoglycaemic action of jasada bhasma in madhumeha which has statistically high significance. Reduction in the level of PPBS after 20 days and after 40 days was also highly statistically significant respectively. Reduction in the level of FUS after 20 days was not statistically significant.

3. Rao VN et al, **Effect of yashada bhasma in streptozotocin-induced diabetes.** Anc Sci Life. 1997 Oct;17(2):114-6.

   The result shows, In control group the blood sugar levels remained elevated throughout the study, whereas the levels returned to near normal by the end of the treatment in treated levels, In rastinon treated group also the blood sugar levels returned to near normal levels, In control group (2) animals died in the last week (40%) No mortality was observed in both treated and rastinon treated groups.

4. Puri R N et al, **Role of zinc (Yashad Bhasma) in arrest of myopia.** Indian J Ophthalmol 1983;31, Suppl S1:816-22

This study was conducted to assess the beneficial role of zinc on 40 cases of myopia. Though there were subjective improvement, but objective improvement was not statistically significant.

Mukta (Pearl)

A natural pearl (often called an Oriental pearl) forms when an irritant works its way into a particular species of oyster, mussel, or clam. As a defence mechanism, the molluska secretes a fluid to coat the irritant. Layer upon layer of this coating is deposited on the irritant until a lustrous pearl is formed.

Synonyms

मुक्ता मुक्ताफलञ्चैव मौक्तिकं मोक्तिकेयकम्। शुक्तिजं शौक्तिकेयञ्च शशिरत्नं शशिप्रियम्।। (R.T.23/63)

Mukta	Muktaphala	Mouktika	Mouktikeya	Shuktija
Shouktikeya	Shashiratna	Shashipriya		

Mineralogical Identification

Pearls are used as gemstones, but are not regarded as true minerals due to their organic origin. Pearl is a mixture of mineral and organic material formed with the soft living tissue of a shelled molluska. Chemically pearls are made of calcium carbonate (mainly aragonite or a mixture of aragonite and calcite).

Chemical composition	Calcium carbonate, ($CaCO_3$)
Colour	White, pink, silver, cream, golden-coloured, green, blue, black.
Cleavage	None
Crystal system	Orthorhombic
Specific Gravity	2.60 to 2.85
Transparency	Translucent to Opaque
Hardness (Moh's Scale)	2.5 to 4.5
Luster	Subadamantine, vitreous, pearly
Fracture	Uneven
Streak	White
Melting point	300°C
Refractive Index	1.52 to 1.66
Dispersion	None

Sources and Occurrence

In fresh water rivers and ponds, mussels produce pearls, while in salt water

they are produced by oysters. Today, fresh water pearls available on the market come primarily from China. Saltwater pearls, on the other hand, are found off the coast of Japan, French Polynesia, and Australia. These fresh water pearl mussels occur not only in hotter climates, but also in colder more temperate areas such as Scotland. Cultured pearls are cultivated in various countries. The live oyster - shells are opened, minute pieces of pearl are kept inside and they are left into sea. After ripening of pearl, they are collected. The pearl are obtained by cycloid worms. They kept forming layers on the nucleus. These are of two varieties, one contains calcium carbonate and other conchialine.

Types

'शुक्तिः शङ्खो गजः क्रोडः फणी मत्स्यश्च दर्दुरः। वेणुश्चाष्टौ समाख्याताः सुज्ञैर्मौक्तिकयोनयः'॥ (A.P.5/13)

According to origin, it is of eight types:

1. Shuktija
2. Shankhaja
3. Hastija
4. Varahaja
5. Sarpaja
6. Matasyaja
7. Darduraja
8. Venuja

Based on the method of preparation, Mukta is of 2 types:

1. Prakruta (natural)
2. Kritrima (artificial)

Kritrima is again of 2 types:

1. Samvardita (cultured pearl)
2. Banavati (prepared from plastic or glass)

Grahya Lakshanas

ह्लादि श्वेतं लघु स्निग्धं रश्मिवन्निर्मलं महत्। ख्यातं तोयप्रभं वृत्तं मौक्तिकं नवधा शुभम्॥ (R.R.S.4/13)

Mukta having the following characteristics are said to be genuine:

1. Hlaadi - Pleasing appearance
2. Shweta - White
3. Laghu - Light
4. Snigdha - Slimy appearance
5. Rashmivat - Bright like sun ray
6. Nirmala - Clean
7. Mahat - Big
8. Toyaprabha - Complexion like water
9. Vritta - Round

Pareeksha

The pearl is rubbed against paddy husk and washed with cow's urine, on which natural one doesn't show any change, while artificial one gets roughened or looses lustre.

Agrahya Lakshanas

रूक्षाङ्गं निर्जलं श्यावं ताम्राभं लवणोपमम्। अर्धशुभ्रं च विकटं ग्रन्थिलं मौक्तिकं त्यजेत्॥ (R.R.S.4/16)

Mukta having the following qualities should be rejected:

1. Rookshanga - Rough surface.
2. Nirjala - Appear like devoid of water or unaqueous.
3. Shyava - Blackish in colour.
4. Tamrabha - Appearance like Tamra.
5. Lavanopama - Salty appearance.
6. Ardhashubhra - Half white.
7. Vikata - Crooked.
8. Grantila - Contains nodules.

Shodhana

जयन्तीस्वरसेनेह दोलायन्त्रे विधानत:।
यामैकं सततं स्विन्नं मौक्तिकं शुद्धिमाप्नुयात्।। (R.T.23/67)

Mukta is purified by subjecting it to swedana in Dolayantra using Jayanti swarasa for 1 yama (3 hours).

Marana

विमलं मौक्तिकं गव्यपयसा परिपेषितम्। त्रिधा लघुपुटे पक्वं मृतं स्याच्छशिसुन्दरम्।। (R.T.23/70)

Shuddha Mukta is powdered in khalwa yantra and triturated with Godugdha. Later chakrikas are prepared, dried and enclosed in sharava samputa. This is subjected to laghu puta. Such 3 laghuputas will make the Mukta bhasma which looks as beautiful like moon.

Mukta Pishti

Shuddha Mukta is grounded with gulab jala for three days, preserved and used as muktapishti.

Probable Physico-chemical changes during above processing

Mukta shodhana is done by swedana method the process that makes the drug biocompatible by converting it into an organometallic complex. Swedana Karma reduces hardness and does biochemical changes favorable to body. The external/physical impurities of Mukta are softened which are further removed by cleansing.

During Marana process, it is clear that particles become fine by extensive grinding and pounding in wet state with various herbs using mortar and pestle and by repeated *putas* applied during the *Marana* process to increase the dissolution as well as the absorption of drug. Studies shows that the percentage of Calcium was greater in *Bhasma* than in raw and purified *Mukta*. Average Calcium percentage was increased in Mukta Bhasma, might be due to loss of organic matter on repeated calcinations.

Pishti stabilize the inherent properties of drug as heating is not involved in the process, but there will be immense reduction in its particle size allowing penetration of that drug at cellular level.

Morphology and distribution of particles in SEM photographs of Mukta bhasma and Mukta pishti not only revealed a decrease in particle size to nano-level, but it also showed the stability of the product from beginning to the final stage. When the particles change from centimeter size to nanometer size, the surface area, and the surface energy increases to the orders of magnitude. These nanoparticles are very easily absorbed through ion channels as they can diffuse readily inside the cells making them effective in absorption, thus avoiding the need for large doses.

Properties and Therapeutic Uses

मौक्तिकं वृष्यमायुष्यं मधुरं शिशिरं परम्।
दीपनं दाहशमनं नेत्र्यं वर्ण्यं च कीर्तितम्।। (R.T.23/72)

Rasa	Madhura
Guna	Sheeta, laghu
Veerya	Sheeta
Vipaka	Madhura
Doshaghnata	Kapha pittahara
Karma	Dhrushti-Agni pushtikara, Vishahara, Bhedi, Veeryaprada, Agni deepaka, Pachana samsthana rogahara, Ayushya, Vrushya, Dahanashaka, Medhya, Asthi-Dantaposhaka
Prayoga	Kshaya, Kasa, Shwasa, Agnimandya, Daha, Jeernajwara, Prameha, Dantodbheda vikaras, Jwara

Dose

आरभ्य गुञ्जापादांशाद् गुञ्जैकप्रमितं मृतम्। मौक्तिकं विनियुञ्जीत बलकालाद्यपेक्षया।। (R.T.23/75)

¼ to 1 Ratti (31-125 mg)

Anupana

Madhu, Navaneeta, different vyadhihara yogas.

Formulations

1. Mukta Panchamrita Rasa
2. Hiranya Garbha Pottali
3. Kasturi Bhairava Rasa
4. Makaradwaja Vati
5. Maha Mriganka Rasa
6. Putapakwa Vishama Jwarantaka Lauha
7. Trailokya Chintamani Rasa
8. Vasanta malati Rasa
9. Kanchanabhra Rasa
10. Vasantatilaka Rasa

Research Updates

1. Joshi N et al, **Standardization and quality control parameters for Mukta Bhasma (calcined pearl).** Anc Sci Life. 2015 Jul-Sep;35(1):42-51.

   The study showed that the raw material *Mukta* was calcium carbonate in aragonite form, which on repeated calcinations was converted into a more stable calcite form. SEM studies revealed that in raw and purified materials the particles were found scattered and unevenly arranged in the range of 718.7–214.7 nm while in final product, uniformly arranged, stable, rod-shaped, and rounded particles with more agglomerates were observed in the range of 279.2–79.93 nm. EDAX analysis revealed calcium as a major ingredient in MB (average 46.32%) which increased gradually in the stages of processing (raw 34.11%, *Śodhita* 37.5%).

2. Nitin Dubey et al,**Antiulcer Activity of a Traditional Pearl Preparation: Mukta Bhasma,** Research J. Pharm. and Tech.2 (2): April.-June. 2009

   Mukta bhasma produces significant anti-ulcer activity in rats. The results suggest that it may act as gastric cytoprotective agent by modulating scavenging of freeradicals as Mukta bhasma exhibits a potent anti peroxidative effect. Its anti-ulcer activity was not dose dependent. The results suggest that Mukta bhasma possess significant gastroprotective activity in lower doses of therapeutic range.

3. Sawant R S et. Al, **Comparative study of mukta bhasma & mukta pishti With reference to their particle size,** International Journal of Ayurvedic Medicine, 2015, 6(1) Supplement, 122-128

   The study shows that particle size of Mukta Pishti is reduced more than Mukta bhasma so that it can be concluded that in Mukta pishti, Properties of Mukta are preserved as there is no direct contact with heat and will be useful in diseases vitiated by Pitta

4. Dr. Poornima B. Tukanatti et al, **Hepatoprotective and Anti-Oxidant Study of Mukta Bhasma (Calx of Cultured Pearls) Against CCl4-Induced Hepatic Damage in Rats (In-Vivo),** Int. J. Life Sci. Pharma Res.12(5), (2022)

   The present study demonstrates that Mukta bhasma 200 mg has shown significant attenuation in the LPO level, increase in CAT and GSH representing significant antioxidant activity of Mukta bhasma. The mode of action of Mukta bhasma in hepatoprotection and antioxidant activity against CCl_4 may be due to cell membrane stabilization, hepatic cell regeneration and activation of antioxidant enzymes such as CAT and GSH. Administration of MB 200 mg has shown significant reduction in the biochemical parameters like SGOT, SGPT, ALP, Bilirubin, Total cholesterol and Total triglycerides with significance when compared to CCl_4 group. Thus, results revealed that Mukta bhasma afford significant hepatoprotective and antioxidant effects in CCl4 induced hepatic damage.

Pravala (Coral)

Coral is marine living organism known as Anthozoan polyp. According to zoology, it is coralligenous zoophytus. Coral belongs to the class Anthozoa in the animal phylum Cnidaria, which includes sea anemones and jelly fish. Unlike sea anemones, corals secrete hard carbonate exoskeletons that support and protect the coral.

A coral reef is an underwater ecosystem characterized by reef-building corals. Reefs are formed of colonies of coral polyps held together by calcium carbonate. Most coral reefs are built from stony corals, whose polyps cluster in groups. It is said that these species, are attached to one another continuously that appears like a plant/tree shape.

Synonyms

प्रवालकं प्रवालश्च भौमरत्नंश्च विद्रुमम्। अब्धिजन्तुविशेषोत्थं तदेव परिकीर्तितम्।। (R.T.23/128)

Pravalaka	Pravala	Bhoumaratna	Vidruma	Abdhi jantu visheshottha
Raktanga	Lathamani	Ambhodhipallava	Raktankura	

Mineralogical Identification

Calcareous coral composed primarily of calcite, $CaCO_3$. Conchiolin corals composed of Conchiolin, the same substance found in pearls and other shells. The colour variation is because of mixing other minerals.

Chemical composition	Calcium carbonate, ($CaCO_3$)
Colour	White, pink, pale to deep rose red. Salmon pink, red to dark red, blue (rarely)
Cleavage	None
Crystal system	Hexagonal
Specific Gravity	1.3-2.12
Transparency	Semi translucent to opaque
Hardness (Moh's Scale)	3
Luster	Dull to Vitreous, waxy
Fracture	Uneven, Splintery
Refractive Index	1.56-1.57
Dispersion	None

Sources and Occurrence

Most coral reefs grow best in warm, shallow, clear, sunny and agitated water less than 50 m deep. Some in habit tropical continental shelves where cool, nutrient-rich up

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welling does not occur, such as the Great Barrier Reef. Others are found in the deep ocean surrounding islands or as atolls, such as in the Maldives. The reefs surrounding islands form when islands subside into the ocean, and atolls form when an island subsides below the surface of the sea. Formation of Pravala is seen abundantly in the Central Pacific Ocean, Indian Ocean, Red Sea, Shores Zanzibar, Madagascar etc.

Types

According to Ratna vigyana, Ratna is of 4 types:

1. Brahmana : Aruna, Shashanka raktavarna, Komala, Snigdha.
2. Kashtriya : Japa, Dadima kusuma prabha.
3. Vaishya : Palasha kusuma, patala sannibha.
4. Shudhra : Rakta utpala dalakara, Katina

According to shape, 2 types:

1. Pravala Shakha : Shape of the branches of tree.
2. Pravala Mula : (honey comb) reef.

Grahya Lakshanas

पक्वबिम्बफलच्छायं वृत्तायतमवक्रकम्। स्निग्धमव्रणक स्थूलं प्रवालं सप्तधा शुभम्।। (R.R.S.4/17)

Genuine Pravala should have the following characteristics:

1. Pakwa bimbi phala - Colour of ripened bimbhi phala (red colour).
2. Vritta - Round.
3. Aayata - Oblong.
4. Avakram - straight or non crookedness.
5. Snigdha - unctuous.
6. Avranaka - even, with no cracks.
7. Sthula - big.

Agrahya Lakshanas

पाण्डुरं धूसरं रुक्षं सव्रणं कोटरान्वितम्। निर्भरं शुभ्रवर्णञ्च प्रवालं नेष्यतेऽशुभम्।। (R.R.S.4/18)

Pravala having the following characteristics are to be rejected:

1. Pandura - Yellowish white
2. Dhusara - Grey colour
3. Ruksha - Rough
4. Savranam - With cracks
5. Kotaranvita - Having holes
6. Nirbhara - Light
7. Shubravarna - White colour

Shodhana

जयन्त्याः स्वरसेनेह दोलायन्त्रे तु विद्रुमम्। यामैकं सुपरिस्विन्नं शुद्धिमायात्यनुत्तमाम्।।

CHAPTER EIGHT

सर्जिकाक्षारसंयुक्ते सलिले परिपाचितम्। यामैकेन प्रवालं तु शुद्धिमायात्यनुत्तमाम्।।
तण्डुलीयद्रवेणेह दोलायन्त्रे तु यामकम्। प्रवालकं परिस्विन्नं शुद्धिमायात्यनुत्तमाम्।। (R.T.23/131-133)

Pravala is purified by subjecting it to swedana in Dolayantra for 1 yama (3 hours) using Jayanti swarasa, Tanduliya rasa or Sarjiksharayukta jala.

Also dipping in hot water with amla dravya will purify the Pravala.

Marana

विशोधितं विद्रुमं तु श्लक्ष्णचूर्णं तु कारयेत्।
कन्याम्भसाऽथ सम्पेष्य शोषयेत् कृतचक्रिकम्।।
सम्पुटस्थं ततः कृत्वा त्रिवारं पुटयेद्भिषक्।
एवं पुटत्रयैर्भस्म जायते शशिसुन्दरम्।। (R.T.23/134-135)

Shuddha Pravala is taken in khalwa yantra and rubbed well to make it a fine powder. Later Kumari swarasa is added to it, triturated and chakrikas are prepared. After drying the chakrikas, they are confined in the sharava samputa and subjected to Gajaputa. Repeating the whole procedure for 3 times subjecting to Gajaputas will incinerate the Pravala.

Instead of Kumari swarasa, Godugdha or Jayanti swarasa or Shatavari swarasa can also be used for bhavana and following the same process will also make the Pravala bhasma (R.T.23/136-138).

Pravala Pishti

Shuddha Pravala is powdered and triturated with the rose water for 21 times or till it becomes the fine form. This is known as Pravala pishti. This is preserved in suitable air tight container and can be used therapeutically in conditions where Pravala bhasma is indicated.

Probable Physico-chemical changes during above processing

To remove the impurities, use of Kshariya or alkaline Sarjikshara jala is recommended in the texts. After purification Pravala looses its shine, it becomes dull, fragile and soft enhancing the absorption. For bhasmikarana, Shuddha pravala is triturated with kumari swarasa, then made into flat cakes, dried in sunlight and subjected to appropriate quantum of heat. Kumari is sheeta, balya, and rasayana. Aloe vera also has anti-inflammatory activity,ulcer healing property and immuno modulatory activity. Due to these qualities it may help in growth of stem cells. It also contains Calcium oxalate, which might increase the Calcification action of drug. By Trituration with Kumari swarasa, an organo-mineral complex is formed and by Marana, particle size is reduced, which enhances bio assimilative effect of Pravala.

By process of mardana while preparing pishti, Pravala looses molecular cohesiveness and it becomes fragile and soft ultimately improving absorption property.

Properties and Therapeutic Uses

Rasa	Kshariya, Madhura
Guna	Laghu, Sheeta
Veerya	Sheeta
Doshaghnata	Tridoshaghna
Karma	Deepana, Pachana, Netrya, Balya, Vrushya, Vishaghna, Bhutaghna, Shukrala, Veerya- Varna vardhana
Prayoga	Kshaya, Kasa, Raktapitta, Atisweda, Ratri sweda

Dose

गुञ्जार्धतः समारभ्य गुञ्जरद्वयमितं परम्। विद्वद्भं विनियुञ्जीत बलकालाद्यपेक्षया।। (R.T.23/142)

½- 2 Ratti (62-250 mg)

Anupana

Madhu, Navaneeta

Formulations

1. Pravala panchamruta Rasa
2. Mukta panchamruta Rasa
3. Kanchanabhra Rasa
4. Ratna garbha Pottali
5. Putapakwa Vishama Jwarantaka Rasa
6. Apurvamalini Vasanta Rasa
7. Maha mriganka Rasa
8. Kasturi Bhairava Rasa
9. Sarvanga Sundara Rasa
10. Vasantatilaka Rasa

CHAPTER EIGHT

Research Updates

1. Reddy PN et al, **Effect of Praval bhasma (Coral calx), a natural source of rich calcium on bone mineralization in rats.** Pharmacol Res. 2003 Dec;48(6):593-9.

   The present study concludes that Pravala bhasma is effective in the prevention of calcium and estrogen deficient bone loss and justify the continuing use of this ayurvedic preparation in traditional system of Indian medicine for management of bone metabolic disorders such as osteoporosis.

2. Namboothiri P K, **A Comparative - Experimental Study of Pravala Pishti and Pravala Bhasma W. S. R. to its Anti-Ulcer Activity-** PG D essertation, Rajiv Gandhi University of Health Sciences (India)

   Pravala Bhasma can be prepared easily. It is acid neutralizing capacity is more and particle size is small compared to Pravala Pishti. Its easy to absorb and properties makes it a potent ulcer protective drug.

3. Singh, A et al, **Anti-Ulcer Activity Of Calcium Based Ayurvedic Bhasmas And Pishti Prepared From Marine-Sourced Animals,** Electronic Journal of Pharmacology and Therapy Vol. 2, 71-76 (2009)

The study concluded that calcium-based bhasmas viz. Shankha bhasma, Kapardika bhasma, Muktashukti bhasma and Pravala bhasma and a pishti viz. Pravala pishti prepared from marine sourced animals have dose dependant anti-ulcer activity.

Vajra (Diamond)

Vajra is one among the precious stone and it is the hardest substance.

Synonyms

हीरको हीरकं हीरमभेद्यं भिदुरं तथा। कुलिशं वज्रकंवज्रं तथोक्तं भार्गवप्रियम्।। (R.T.23/5)

Hiraka	Hirakam	Hiram	Abhedhyam	Bhidura
Kulisha	Vajrakam	Vajram	Bhargavapriyam	Bhrugupriya

Mineralogical Identification

Diamonds are made of carbon so they form as carbon atoms under a high temperature and pressure; they bond together to start growing crystals. That's why a diamond is such a hard material because each carbon atom participating in four of these very strong covalent bonds that form between carbon atoms.

Chemical composition	C (elemental carbon)
Colour	Most often colorless to yellow or brown. Rarely pink, orange, green, blue, gray or red.
Luster	Adamantine - the highest level of luster for a nonmetallic mineral
Crystal system	Cubic
Crystal habit	Octahedral, cubo-octahedral, spherical or cubic
Cleavage	Octahedral; perfect and easy
Specific Gravity	3.516-3.525
Diaphaneity	Transparent, translucent, opaque
Hardness (Moh's Scale)	10
Fracture	Conchoidal
Streak	None or colorless
Refractive Index	2.417
Dispersion	0.044
Melting point	3550°C
Boiling point	4830°C

Sources and Occurrence

The earliest sources of gem diamonds were India and Borneo, where they were

found in river alluvium. All famous diamonds of antiquity were Indian diamonds, including the Great Mogul, the Orlov, the Koh-i-noor, and the Regent or Pitt. Russia, Botswana, Congo (Kinshasa), Australia, and South Africa are now the world's major diamond-producing nations; other important countries include Canada, Angola, Namibia, Ghana, and Brazil.

Types

वज्रं च त्रिविधं प्रोक्तं नरो नारी नपुंसकम् । पूर्वं पूर्वमिह श्रेष्ठं रसवीर्यविपाकतः।। (R.R.S.4/26)

Based on the gender, vajra are of 3 types. They are superior in order on the view of their rasa, veerya and vipaka. They are:

1. Nara vajra- uttama- can be used by all.
2. Nari vajra- madhyama- for the use of females.
3. Napunsaka vajra- adhama- for the use of napumsakas.

अष्टास्रंश्चाऽष्टफलकं षट्कोणमतिभासुरम्। अम्बुदेन्द्रधनुर्वारितरं पुंवज्रमुच्यते।।
तदेव चिपिटाकारं स्त्रीवज्रं वर्तुलायतम्। वर्तुलं कुण्ठकोणाग्रं किंचिद्गुरु नपुंसकम्।। (R.R.S.4/27-28)

The characteristics of the types of Vajra are:

1. Nara vajra- Ashta asra (eight edges), Ashta phalaka (eight surfaces), Shat kona (six angles), Atibhasura (stunning brightness), Ambudendradhanu (reflecting the VIBGYOR colours of rainbow and Varitara (light).
2. Nari/stree vajra- Chipitakara (flat), Vartula ayata (oval in shape).
3. Napumsaka vajra- Vartula (round in shape), Kuntakonagra (devoid of corners or angles), Kinchit guru (slightly heavy).

श्वेतादिवर्णभेदेन तदेकैकं चतुर्विधम्। (R.R.S.4/30)

The above 3 varieties are again of 4 types based on their colours.

Their jaati and prabhava are as follows : (A.P.5/15-17)

1. Shweta - Brahmana- Rasayana and sarva siddhiprada.
2. Rakta - Kshatriya- Vyadhinashaka, jara and mrutyuhara.
3. Peeta - Vaishya- Dhanaprada and dehadardyakara.
4. Krishna - Shudra- Vyadhinashaka and vayasthambaka.

Dosha of Vajra : (A.P.5/32-34)

The 5 doshas of Vajra are:

1. Bindu : Looks like drop of water or spot of any colour inside the diamond. Vajra having this dosha is nisphala and causes loss of wealth.
2. Kakapada : The mark in diamond looks like foot of crow. This doshayukta vajra leads to death.

3. Yava : The barley shaped mark in the diamond of the colours red, yellow, white and black. Among these, if it is white in colour, it is considered good and remaining colours are not preferred.
4. Mala : Impurity or partial opacity in the diamond at their edges, corners or at the centre. Wearing such doshayukta vajra leads to the bhaya of fire and animals like tiger.
5. Rekha: Criss cross lines in diamond. Among these, left lines are good, but others gives bad luck to wearer.

Grahya Lakshanas

स्निग्धं विद्युद्विभं स्वच्छमलेख्यं च विलेखनम्। तीक्ष्णं षट्कोणमष्टास्रं जात्यं हीरकमुच्यते ।। (R.T.23/6)

Genuine Vajra should have the following qualities:

1. Snigdha - Unctuous.
2. Vidyudvibham - Shining like lightening.
3. Swachcha - Clean.
4. Alekhyam - Unable to cut it.
5. Vilekhanam - Which can cut other things like glass.
6. Teekshna - Sharp.
7. Shatkona - Six angles.
8. Ashtasra - Eight surfaces.

Agrahya Lakshanas

वर्तुलं मलिनं नीलं भूत्याभं स्फुटितं खरम् । सकाकपादं रेखाढ्यं हेयं हीरकमादिशेत् ।। (R.T.23/7)

Vajra having the following qualities is not acceptable:

1. Vartula - Round.
2. Malina - Dirty.
3. Neela - Blue colour.
4. Bhoootyabha - Appears as if covered with ash.
5. Sphutita - Broken.
6. Kharam - Rough.
7. Sakakapada - Having the impressions resembling the crow's feet.
8. Rekhadya - Having lines over it.

Pareeksha

यन्निकाषफलके शिलातले घृष्यते न हि निकामघर्षितम्।
लीलयैव दलयत्यथापरान् तद्वरं भिदुरमीरितं बुधैः।। (R.T.23/8)

Vajra is said to be the best and genuine-

- If Diamond is rubbed over the rough surface of the stone and Diamond remains unchanged.
- If Diamond is rubbed over the surface of glass or metals, it cuts the surfaces by its sharp edges.

Shodhana

Need of Shodhana

अविशुद्धं मृतं हीरं शीलितं पार्श्ववेदनाम्। कुष्ठं तापं भ्रमादींश्च जनयत्यविलम्बितम्।। (R.T.23/9)

Improperly purified or incinerated vajra causes:

1. Parshwavedana
2. Kushta
3. Tapa
4. Bhrama

कुलत्थक्वाथसंयुक्तं हीरं दोलाख्ययन्त्रगम्। स्विन्नं दिनत्रयं यत्नाद्विशिष्टां शुद्धिमाप्नुयात्।। (R.T.23/11)

Vajra is purified by subjecting it to swedana in Dola yantra for 3 days using Kulattha qwatha.

S.No.	Drugs used	Method of Shodhana	Reference
1	Kulattha qwatha	Swedana for 3 days	R.T. 23/11
2	Snuhi ksheera	Nirvapa for 100 times	R.T. 23/12

Marana

कुलत्थक्वाथसंयुक्तलकुचद्रवापिष्टया। शिलया लिप्तमूषायां वज्रं क्षिप्त्वानिरुध्य च।।
अष्टवारं पुटेत्सम्यग्विशुष्कैश्च वनोपलैः। शतवारं ततो ध्मात्वा निक्षिप्तं शुद्धपारदे।।
निश्चितं म्रियते वज्रं भस्म वारितरं भवेत्।। (R.R.S.4/38-39)

Shuddha Manahshila which is triturated with Kulattha kwatha and Lakucha swarasa is smeared inside the moosha and dried. Later, Shuddha Vajra is enclosed in this moosha, dried and subjected to 8 putas by placing the moosha in the midst of vanopalas. Then Vajra removed from the puta is heated intensively in the agni and dipped in Shuddha Parada for 100 times. By this, Vajra will be incinerated certainly and it will attain the Varitara property.

हीरकं विमलं सूतं मृतन्तु समभागिकम्। मनःशिलां गन्धकञ्च समं दत्त्वा विमर्दयेत्।।
सम्पुटस्थं तु पुटयेद् वारणाख्ये पुटे भृशम्। तावत्पुटेत्प्रयत्नेन यावन्नायाति पञ्चताम्।।
द्वितीयादिपुटेष्वत्र सूतं न विनियोजयेत्। एवं चतुर्दशपुटैर्हीरकं म्रियते ध्रुवम्।। (R.T.23/18-20)

Shuddha Vajra is mixed with the equal quantity of Parada bhasma or Rasasindura, Shuddha Manahshila and Shuddha Gandhaka in the khalwa yantra and triturated to form an homogeneous mixture. This mixture is enclosed in sharava samputa and subjected to one Gajaputa.

From the second puta onwards, the product obtained from first puta is mixed with the drugs mentioned above except Parada bhasma or Rasasindura, and subjected to Gajaputa. Likewise, Vajra is subjected to such 14 Gajaputa will certainly incinerates the Vajra.

Probable Physico-chemical changes during above processing

Chemically, diamond is an allotropic form of carbon in a cubic system. Sixty elements have now been identified as occurring in a diamond. Some diamonds contain visibly quite large inclusions of up to a millimetre in diameter. The inclusions may be gaseous, liquid, or solid. Therefore, the Shodhana process may help to remove undesirable material from the rough diamond scraps. Kulatha is having Ushna veerya and Bhedana property. Hence Vajra Shodhana by swedana in Kulattha kwatha may help to decrease the hardness of the diamond and the material become more feasible for the next marana process. Diamond has the highest thermal conductivity, so heat is the only treatment that can be applied to break down its bonds. Snuhi ksheera is having teekshna and chedana property. So Nirvapa in Snuhi ksheera makes the Diamond brittle. The coefficient of thermal expansion of diamond is extremely low, so much time is required for heating and dipping processes.

Properties and Therapeutic Uses

Rasa	Shadrasa
Guna	Snigdha
Doshaghnata	Tridoshnashaka
Karma	Ayushprada, Yogavahi, Hridya Param, Rasayana, Vayasthambhakara, Vrushya, Klaibyahara, Kanthivardaka, Deepaka, Netrya, Balya, Sarvarogahara, Parada bandaka, Maraka, Mrutyuhara
Prayoga	Rajayakshma, Pandu, Shotha, Bhrama, Bhagandara, Shosha, Prameha, Medovikara, Udara.

Dose

रक्तिकाया नेत्रगुणभागतस्तु कलांशकम्। मृतं हीरं प्रयञ्जीत बलकालाद्यपेक्षया।। (R.T.23/28)

1/32 - 1/16 ratti (4-8 mg)

Vajra bhasma matra nirmana : (R.T.23/29-30)

1 Ratti (125 mg) of Vajra bhasma is mixed thoroughly in the khalwa yantra with the 4 Mashas (4 gms) of Rasasindura and stored. 1-2 ratti (125-250 mg) of the mixture is administered whenever required.

Anupana

Rasa sindoora or Abhraka bhasma and Madhu.

Formulations

1. Panchamruta Rasa
2. Maha Lakshmi Vilasa Rasa
3. Navaratna Raja mrganka Rasa
4. Vasanta Kusamakara Rasa
5. Kamadeva Rasa
6. Mahamrganka Rasa
7. Ratnagarbha Pottali
8. Mani Parpati
9. Kandarpa Sundara Rasa
10. Trailokya Chintamani Rasa

Research Updates

1. Parekh DN et al, **An exploration of the preliminary unit operative pharmaceutical process of Vajra Bhasma (diamond ash)**. J Drug Res Ayurvedic Sci. 2022;7:243-52.

   This study shows that, 108 times of repeated heating and quenching resulted in 2.84% weight loss after Shodhana. A 9.30% weight gain was found at the end of the Marana process. 60 Putas were sufficient for the Bhasma Sidhhi Lakshanas like Varitratva, Nishchandratva etc. The soaking method of the Bhavana method is advisable in the Marana process.

2. Ankush Paladhi et al, **Nanoscale Diamond-Based Formulation as an Immuno-modulator and Potential Therapeutic for Lymphoma,** Pharmacol., Volume 13-2022.

   This work demonstrates for the first time the immuno stimulatory and Antitumor properties of nano diamonds-based ayurvedic herbomineral preparations against highly metastatic and aggressive murine lymphoma. The unique capacity of the Ayu_ND to activate dendritic cells suggests its potential to initiate strong, long-lasting adaptive killer cell immunity with a distinct memory phenotype. Strong interactions of monocrystalline nano diamonds based ayurvedic formulations with the immune system usher a new understanding in therapeutics.

3. Upendra U. Zala et al, **A Comparative Analytical Study of Hiraka Bhasma (Diamond-Ash),** IJLTEMAS, Volume V, Issue III, March 2016

   Analytically Hiraka Bhasma posses Fe_2O_3 as a major compound. Color of the Hiraka Bhasma is Malina Rakta which is due to presence of Fe_2O_3. Particle size of Hiraka Bhasma-I & II were found 113 µm & 69.4 µm VMD respectively.

Synonyms

वराटको वराटश्च वराटी च वराटिका। कपर्दकः कपर्दश्च कपर्दी च कपर्दिका।।
बालक्रीडनकश्चापि चरो चर्यश्चराचरः। वराटकं वराटं च कपर्दं च निगद्यते।। (R.T.12/82-83)

Varataka	Varata	Varati	Varatika	Kapardaka	Kaparda
Kapardi	Kapardika	Balakreedanaka	Chara	Charachara	

Vernacular Names

Sanskrit	-	Kaparda, Varatika
English	-	Cowrie, Marine shell
Hindi	-	Kaudi
Scientific Name	-	Cypraea Moneta
Phylum	-	Mollusca
Class	-	Gastropoda
Family	-	Cypraeidae

Minerological Identification

Properties

Chemical composition	$CaCO_3$
Colour	Colorless or White
Luster	Vitreous to pearly on cleavage surfaces
Crystal system	Trigonal
Cleavage	Perfect
Specific Gravity	2.71
Diaphaneity	Transparent to translucent.
Hardness (Moh's Scale)	3
Fracture	Conchoidal
Streak	White

Sources and Occurrence

Kaparda is external shell of sea animal Cypreae moneta. It is a sea snail lives in shallow waters of warm seas. When these reaches the Coastal areas of the sea or get stuck in the fish net, they are collected by fishermen. The fleshy part is used as food and shell part is collected as Kaparda.

Types

According to R.R.S., Varatika is of 2 types:

Formulations

1. Panchamruta Rasa
2. Maha Lakshmi Vilasa Rasa
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Kaparda (Cowries)

Kaparda is categorised under Sadharana rasa based on its usage in Parada processing and also categorised under sudha varga based on its colour and chemical constituent. Other than its medicinal use, it is used for playing purpose by children and also used to tell jyothishya. Kaparda is also used over domestic animal's neck as neckless form. Its usage is also seen for the decorative purpose over cloth and ornaments by men and women.

Synonyms

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Types

According to R.R.S., Varatika is of 2 types:

I. Varatika or Charachara- This is oval, yellow in colour and possess nodule at its back. Based on its weight, Varatika is of 3 types:

सार्धनिष्कभारा श्रेष्ठा निष्कभारा च मध्यमा।
पादोननिष्कभारा च कनिष्ठा परिकीर्तिता।। (R.R.S.3/131)

1) 1 ½ Nishka (36 Ratti)- Superior

2) 1 Nishka (24 Ratti) - Medium

3) ¾ Nishka (18 Ratti) - Inferior

II. Varata- This is Laghu, vitiates Kapha and pitta dosha and not used for any therapeutic purposes.

वराटिका त्रिधा प्रोक्ता पीता श्वेता च धूसरा। पीतोत्तमा मध्यमा तु श्वेतान्या त्वधमा मता।। (R.T.12/84)

Based on the colour, Kaparda is of 3 types:

1. Peeta - Uttama. 2. Shweta - Madhyama. 3. Dhoosara - Adhama.

Grahya Lakshana

पीताभा ग्रन्थिका पृष्ठे दीर्घवृत्ता वराटिका। रसवैद्यैर्विनिर्दिष्टा सा चराचर संज्ञिका।। (R.R.S.3/130)

Characteristics of genuine Kaparda are:

1. Peethabha- yellow in colour.
2. Grantika prushte- nodule at the back.
3. Deergha vrutta- oval.

दीर्घवृन्ता स्वर्णवर्णा पृष्ठे च ग्रन्थिला तथा। सार्द्धैकशाणप्रमिता वराटी कथितोत्तमा।।
शणोन्मिता मध्यमा स्याच्छाणार्द्धप्रमिताधमा। रसज्ञैरुत्तमैवेह भस्मकर्मणि शस्यते।। (R.T/85-86)

According to R.T., Best Kaparda which can be used for incineration should have the following characteristics:

1. Deergavrinta - Oval in shape.
2. Swarnavarna- Golden yellow in colour.
3. Prusta Granthila - small nodule in its posterior part.
4. 1 ½ Shaana (6 Masha) Varatika - Uttama.
5. 1 Shaana (4 Masha) Varatika - Madhyama.
6. ½ Shaana (2 Masha) Varatika - Adhama.

Shodhana

I Method

वराटा: काञ्जिके स्विन्ना यामाच्छुद्धिमवाप्नुयु:। (R.R.S.3/134)

Varata becomes Shuddha when it is subjected to swedana in Dolayantra for 3 hours using Kanji as liquid medium.

II Method

अम्लेन केनचिद्वापि दोलायन्त्रे विपाचिता। वराटी याममात्रेण विशुद्धयति न संशयः।। (R.T.12/89)

Undoubtedly Varata becomes purify if it is boiled in Dolayantra for 3 hours using any Amla dravas.

S.No.	Drugs used	Method of Shodhana	Reference
1	Kanji	Swedana in Dolayantra for 3 hours	R.R.S.3/134 R.T.12/87
2	Kulattha kwatha	Swedana in Dolayantra for 3 hours	R.T.12/88
3	Any Amla dravya	Swedana in Dolayantra for 3 hours	R.T.12/89

Marana

I Method

वराटकांस्तु विमलान् शरावे स्थापयेद्भिषक्। शरावेणापरेणाथ सम्यगाच्छादयेत्ततः।।
सन्धिलेपं ततः कृत्वा शोषयेदातपे पुनः। करीषाग्नौ पचेत्कामं यत्नतस्तु भिषग्वरः।।
स्वाङ्गशीतं समुद्धृत्य खल्वे सञ्चूर्णयेत्ततः। शरदिन्दुनिभं भस्म सर्वयोगेषु योजयेत्।। (R.T.12/91-93)

Shuddha Varata are taken in Sharava and after enclosing with another Sharava, the gaps are sealed and dried. Later Sharava samputa was subjected to Gaja puta and after Swangasheeta, the bhasma inside the Sharava samputa was taken out and triturated well in Khalwa yantra and stored. This bhasma which is as white colour as moon can be used for all therapeutic purposes.

II Method

वराटिका विशोधिता त्वलातकानले स्थिता। यदा भवेत्तु प्रफुल्लिता मृता तदाशनोचिता।। (R.T.12/94)

Shuddha Varatika is placed over the burning charcoal till it blooms. When it becomes light and brittle, it is collected, triturated and can be used for therapeutic purposes.

S.No	Drugs used	No. and Type of Puta	Reference
1	Shuddha Kaparda	Gaja puta	R.T. 12/91-93

Probable Physico-chemical changes during above processing

By Swedana process, the external/physical impurities of substances are softened/ dissolved which are further removed by cleansing. Kanji or any Amla dravas has been indicated as liquid media for Swedana. Kanji properties can also be appreciated just by its touch. Hence, in the process Swedana in Kanji, only physical contact is enough to impose its properties. It increases the surface area due to which micro cracks formed resulting in fluid particle interaction, which provide easy and greater efficiency of liquid media responsible for Shodhana. Increased pH of Kanji or Amla dravas during the swedana procedure shows that alkaline particles of Kaparda have diffused into

Kanji indicating that diffusion has taken place and the Fick's law of diffusion of the concentration gradient can be appreciated in this process.

Marana is a procedure adopted to convert the heterogeneous material in to homogenous substance and converting it in to micro fine particles by the process of Annealing.

Properties and Therapeutic Uses

पारिणामादिशूलघ्नी ग्रहणीक्षयनाशिनी। कटूष्णा दीपनी वृष्या नेत्र्या वातकफापहा।।
रसेन्द्रजारणे प्रोक्ता विडद्रव्येषु शस्यते।। (R.R.S.3/132-133)

Rasa	Katu, Tikta
Guna	Guru
Veerya	Ushna
Vipaka	Katu
Doshaghnata	VataKapha hara
Karma	Agnideepana, Pachana, Vrushya, Grahi, Netrya.
Prayoga	Netraroga, Karnasrava, Agnimandya, Parinama shoola, Grahani, Kshaya, Apachi, Sphota, Vid dravya nirmana

Dose

मात्रा रक्तिद्वयोन्मिता ।। (R.T.12/93)

Dose of Kaparda bhasma is 2 Ratti (250 mg)

Anupana

Water, Nimbuswarasa, Trikatu kashaya

Important Formulations

1. Agnikumara Rasa
2. Pravala panchamruta Rasa
3. Grahani kapata Rasa
4. Pradarantaka Lauha
5. Lavangadi Vati
6. Rajamriganka Rasa
7. Hemagarbha Pottali
8. Ratnagarbha Pottali Rasa

Research Updates

1. Rohit Kumar Ravte et al, **Efficacy of Kaparda bhasma, a popular ayurvedic drug in the management of Amlapitta (Acid peptic syndrome)** EJPMR, 2015, 2(5), 394-401

The results showed that Kaparda bhasma is potent drug in the treatment of Amlapitta without any ADR. The effect of Kaparda bhasma on amlotkalesh is 50%, on sirovedna 75%, on antrikujana and angasada 66.66%, on avipaka 60%, gorava 75%. The overall relief was 47.96%.

2. Dr. N. B. Mashetti et al,**A Clinical Study and Management of Peptic Ulcer by Tiktadya Ghrita and Kaparda Bhasma.** PIJAR, VOLUME-I, ISSUE -III/January-February-2017

The overall effect of the two groups was assessed, it was observed that in Tiktadya ghrita 75% had moderate remission and in the Tiktadya ghrita and Kaparda bhasma group 80% had moderate remission and 20% had average remission.

3. Khobragade Vaishali Mahadeorao et al,**Standardization of Kapardika bhasma prepared with the classical method of Rasachandanshu** IJCRT, Volume 11, Issue 10 October 2023

The effect of the shodhana procedure on Kapardika is that it becomes lustreless and whitish in colour from yellow. The XRF analysis shows a slight increase in Ca content after shodhana and Marana.

Shukti (Oyster Shell)

The oysters are the various marine bivalve mollusks belonging to the family Ostreidae, that have a rough irregular shell closed by a single adductor muscle. The two valves of the oyster shell, which differ in shape, have rough surfaces that are often a dirty gray. The upper valve is convex, or higher at the middle than at the edges. The lower valve, fixed to the bottom or to another surface, is larger, has smoother edges, and is rather flat. The inner surfaces of both valves are smooth and white.

Pearls are formed in oysters by the accumulation of nacre, the material lining the oyster shell, around a solid piece of foreign matter that has become lodged inside the shell.

CHAPTER EIGHT

Synonyms

शुक्तिश्च शुक्तिका चापि मुक्तामाता तथैव च। मुक्तागृहं महाशुक्तिः मौक्तिकप्रसवा च सा ॥ (R.T.12/61-63)

Shukti	Shuktika	Muktamata	Mukta gruha	Mahashukti
Mouktika prasava	Abdhimanduki	Muktasphota	Mouktika mandira	Mukta prasu

Vernacular Names

Sanskrit - Shukti

English - Oyster shell

Hindi - Seep

Kannada - Kappechippu

Mineralogical Identification

Chemically Oysters are calcium carbonate ($CaCO_3$). They are an excellent source of Calcium, Magnesium, Sodium, Copper, Iron, Zinc, Selenium, Vitamin A & Vitamin B_{12}.

Chemical composition	$CaCO_3$
Colour	Whitish grey outside, porcelain white inside.
Specific Gravity	1.152 g/cm_3
pH	4 to 9

Sources and Occurrence

True oysters, which belong to the Ostreidae family, are found throughout the world's oceans, usually in shallow waters and in colonies called beds or reefs. Among the most popular and heavily harvested species are the eastern American oyster found in Atlantic waters from Canada to Argentina, and the Pacific oyster found from Japan to Washington state and as far south as Australia. A number of oyster species occurs in Indian waters. The native Indian oyster (C. madrasensis) occurs throughout the coast of India, mainly in Andaman, Bombay, Madras, Kerala, Orissa.

Types

In Rasashastra, there are references of 2 types of Shukti:

1. Mukta Shukti (Pearl oyster)- which forms pearl in it.
2. Jala Shukti (oyster)- which does not forms pearl in it.

Shodhana

जयन्त्याः स्वरसेनैव शुक्तिं दोलगतां पचेत।
यामैकेनैव नियतं शुक्तिः शुद्धिमवाप्नुयात।। (R.T.12/66)

Shukti will get purified by making it to pieces and subjecting it to swedana for 1 yama (3 hours) kala in dola yantra containing Jayanati swarasa. Later drug is collected from pottali, washed & stored for further processing.

S.No.	Drugs used	Method of Shodhana	Reference
1	Jayanati swarasa	Swedana for 3 hours	R.T.12/66
2	Kanji or any Amla drava	Swedana for 3 hours	R.T.12/67

Marana

शुक्तिकां खण्डशः कृत्वा सम्पुटस्थां ततः पुटेत्।
हिमकुन्देन्दुसङ्काशां शुक्तेर्भूतिं समाहरेत्।। (R.T.12/68)

Pieces of Shuddha Shukti are enclosed in sharava samputa and subjected to 1 Gajaputa. Then the powder obtained is triturared to fine form and obtained white coloured Shukti bhasma is stored in an air tight container.

If bhasma siddhi lakshanas are not appreciated, then it should be subjected to bhavana with Jala or Kumari swarasa. Later chakrikas are prepared and subjected to Gaja puta by placing these chakrikas in sharava samputa.

Probable Physico-chemical changes during above processing

Shukti shodhana is done by Swedana in Dolayantra using Kanji or amla dravas. During this process, many physico-chemical changes can be inferred. Physical impurities will be removed, making the shukti white, brighter, smooth and shining. Shodhana process makes the Shukti more fragile with a view to reduce it to a fine powder form by the process of Marana.

Swedana is done with drugs of acidic nature and these are chemically active and potent, so certain chemical reaction might take place during swedana. Probable chemical changes would be oxidation, reduction, neutralization, salt formation and formation of complex conjugates etc. might happen upon Shukti.

Kumari Bhavana was done before subjecting it to further Putas because Kumari is a reducing agent, helps in disintegration of particles and thus getting more fineness to Bhasma in successive heating. Kumari Swarasa contains 'Aloin', alkaline chemical constituents which help in break down of particles. Also the impregnation or trituration loosens the molecular cohesiveness and helps Shukti to break into fine particles during the subsequent processing. Kumari Bhavana reduces the alkaline property of Shukti Bhasma, making it weak base, having unionized forms of ions, which are readily absorbed by the cells. Kumari has Vatakaphahara Swasahara property and due to the good purgative effect, it also counteracts the constipating effect of Calcium carbonate. Role of aloe vera juice as a triturating medium has been studied by incinerating the material triturated with and without aloe vera juice. It was found that trituration prevents formation of CaO by interfering with heat transfer and maintaining the product in calcite form. Additionally, it helps to reconvert $Ca(OH)_2$ to $CaCO_3$ by maintaining CO_2 atmosphere due to burning of organic matter in aloe vera juice.

Jala is neutral in pH, universal solvent and absorbs enormous amount of heat. Hence its usage in Shukti Bhavana, helps in reducing the alkalinity of Shukti. Water helps in holding the CaO and also preventing the further disintegration of CaO.

Properties and Therapeutic Uses

Rasa	Madhura; Jalashukti -Katurasa
Guna	Snigdha
Doshaghnata	Vatapitttahara
Karma	Ruchikara, Pachaka, Deepana, Vishanashana
Prayoga	Udarashoola, Hridayashoola, Pleeha, Udara, Swasha, Jwara, Mootrasarkara

Dose

Ratti (250 mgs).

Anupana

Madhu, Ghrita, Dugdha.

Formulations

1. Grahanishaardula Rasa
2. Vranatopanaratha Churna
3. Lootavishanashaka Agada
4. Vadavanala Rasa
5. Maharanadhakam
6. Pravalapanchamruta Rasa
7. Vishamajwarantaka Rasa

Research Updates

1. Parmar KK et al, **Pharmaceutical standardization of Jala Shukti Bhasma and Mukta Shukti Bhasma.** Ayu. 2012 Jan;33(1):136-42.

   There is no significant color difference between Jala Shukti Bhasma and Mukta Shuikti Bhasma i.e. white and bright white respectively. Varitaratwa Bhasma Pariksha was found positive in both the Bhasma. At the end of the pharmaceutical procedure, it was found that *Mukta Shukti Bhasma* is 2.8 times costlier than *Jala Shukti Bhasma.*

2. Sreejith R et al, **Mukta-sukti bhasma; nectar for acid peptic disorders, W.S.R to its anti-ulcer activity- an experimental study.** Anc Sci Life. 2012 Dec;32

   The Mukta sukti Bhasma showed highly significant Anti ulcer activity than standard group (Sucralfate) when compared. The alkaline pH and chemical components might have contributed by inhibiting secretions, neutralizing the acidity and reducing size of the ulcerative lesions. Presence of Calcium (Ca), Magnesium (Mg), Manganese (Mn), Iron (Fe), Potassium (K), Aluminum (Al), Copper (Cu), Sodium (Na) and Zinc (Zn) were detected in raw Mukta sukti and Mukta sukti Bhasma. X ray diffraction shows face centered Cubic, hexagonal, tetragonal and monoclinic crystal structures.

3. Rajni et al. **Pharmaceutical and comparative evaluation of three Sudhavargiya drugs named Kukkutanda twak bhasma, Mukta shukti bhasma and Godanti bhasma,** WJPR, Volume 4, Issue 4, 1135-1142.

   Organoleptic evaluation of all Bhasma showed those to be white smooth tasteless without any odor. The pH of Kukkutanda Twak Bhasma was 7.5, Mukta-Shukti Bhasma 9.5 and Godanti Bhasma 6.0. It showed that Mukta-Shukti Bhasma is more alkaline than other. The qualitative analysis shows carbonate, chloride, sulphate were present in all these Bhasma but phosphate is absent. In AAS test it has been proved that Kukkutanda Twak bhasma has maximum Iron in ppm (60.830%w/w) in comparison to Mukta-Shukti Bhasma (40.047%w/w) and Godanti bhasma (28.690%w/w). Quantitative analysis shows Kukkutanda Twaka Bhasma has highest calcium than other two Bhasmas

Shankha (Conch Shell)

Shankha is the exoskeleton formed by secretion of Gastropoda class snails which belongs to phylum mollusca. It is classified under different vargas like Uparasa, Shukla, Shweta, Sudha, Shodhaniya, Shankhadi and Uparatna varga. Conch refers to several species of marine gastropods with medium or large spired and ornate shells. Typical species include the queen conch (Aligergigas) of the family Strombidae. These are also referred to as "true conches".

Shankha is the outer covering of "Mollusca group" of aquatic animal which are seen in sea. Shell, is a hard, protective outer layer usually created by an animal that lives in the sea. It is collected from the sea and immersed in boiling water. The animal which is present inside dies and the outer portion, shankha is collected and sold in market. Sometimes empty seashells are often found washed up on beaches are collected by beach combers. The shells are empty because the animal has died and the soft parts have been eaten by another animal or have decomposed.

Synonyms

शङ्खस्तु शङ्खकः कम्बुस्त्रिरेखश्च समुद्रजः। सुनादो दीर्घनादश्च कम्बोजश्च प्रकीर्तितः॥ (R.T.12/1)

Shankha	Shankhaka	Kambhu	Trirekha	Samudraja
Sunadha	Deerghanadha	Arnobhava	Bahunada	Deerghanada
Dhavala	Haripriya	Jalaja	Kamboja	Mahanada
Mangalaprada	Sunada	Suswara	Varichara	Varija

Vernacular Names

Sanskrit : Shankha
English : Conch Shell
Latin Name : Xanchus pyrum or Turbinella rapa
Hindi : Shankh
Kannada : Shankha

Mineralogical Identification

Aragonite forms naturally in almost all molluska shells. Aragonite is a carbonate mineral, naturally occurring crystal forms of calcium carbonate, $CaCO_3$. It is formed by biological and physical processes, including precipitation from marine and freshwater environments.

Chemical composition	$CaCO_3$
Colour	White, red, yellow, orange,

Cleavage	Imperfect
Crystal system	Orthorhombic
Crystal habit	Pseudohexagonal, prismatic crystals
Specific Gravity	2.95
Transparency	Translucent to transparent
Hardness (Moh's Scale)	3.5-4
Luster	Vitreous, resinous on fracture surfaces
Fracture	Subconchoidal
Streak	White

Sources and Occurrence

These are widely dispersed in marine water. It can occur in all the sea shores. Conches are found in the Indian Ocean, between Myanmar (Burma) all the way to Sri Lanka. There are three main localities of Shankha in India. Shells from all the localities show definite morphological variations. The three localities are 1) the Indian Ocean near Ram Setu, Sri Lanka, Rameshwaram to Tuticorin; 2) Arabian Sea or Western India; 3) Bay of Bengal. The imitation (Lightning Whelks) mostly come from Florida and the Gulf of Mexico.

Types

शङ्खस्तु द्विविधः प्रोक्तो रसतन्त्रविचक्षणैः। प्रथमो दक्षिणावर्तो वामवर्तोऽपरो मतः।। (R.T. 12/3)

Two types of Shankha are-

1. Dakshinavarta : It is rare and not preferred for preparation of Bhasma. It is mangalyakaraka & krimighna.
2. Vamavarta : It is found abundantly in all sea shores. It is preferred for preparation of Bhasma.

Grahya Lakshanas

वृत्तः स्निग्धः सूक्ष्ममुखो निर्मलश्चेन्दुसुन्दरः। दीर्घकायो गुरुश्चापि शङ्खः श्रेष्ठः प्रकीर्तितः।। (R.T. 12/2)

The characteristics of the best shankha are:

1. Vrutta - Round.
2. Snigdha - Unctuous.
3. Sookshma mukha - Which has small opening towards the base.
4. Nirmala - Clean.
5. Indusundara - Beautiful and bright like full moon.
6. Deerghkaya - Which is lengthy & heavy body.
7. Guru - Heavy.

Shodhana

काञ्जिकेन पचेच्छंखं दोलायन्त्रे भिषग्वरः। क्षालयेच्चोष्णतोयेन शंखः शुद्धिमवाप्नुयात्।। (R.T. 12/10)

Shankha made into smaller pieces and subjected to swedana for 1 yama (3 hours) in dolayantra containing kanji, later shodhita Shankha in the pottali is collected, washed with warm water, dried & stored.

S.No.	Drugs used	Method of Shodhana	Reference
1	Jambira swarasa	Swedana for 12 hours	R.T.12/6-7
2	Jayanthi swarasa	Swedana for 3 hours	R.T.12/8
3	Tanduliya swarasa	Swedana for 3 hours	R.T.12/9
4	Kanji	Swedana for 3 hours	R.T.12/10

Marana

शुद्धशङ्खस्य खण्डानि शरावे स्थापयेत्सुधीः। शरावेण पिधायाथ यत्नात्सन्धिं प्रलेपयेत्।।
आपते त्वथ संशोष्य पुटेद् गजपुटे भिषक्। स्वतः शीतं समुद्धृत्य खल्वे सञ्चूर्णयेद्भिषक्।।
चूर्णितञ्चाथ विज्ञाय सम्पुटस्थं ततः पुटेत्। एवं पुटद्वयेनैव शङ्खको मृतिमाप्नुयात।। (R.T. 12/17-19)

Pieces of shodhita Shankha are taken in Sharava, sandhi bandhana is done by closing it with another sharava, dried in sun and subject it to 1 Gajaputa. After self cooling, content inside the sharava is taken and triturated in khalwa yantra to make it a powder. Then this powder is again enclosed in sharava samputa and subjected to one more Gajaputa. By such 2 Gajaputas, Shakha will becomes bhasma.

Probable Physico-chemical changes during above processing

Nimbu rasa or Kanji are acidic in nature, so when Shankha is boiled in these media, the excess alkalinity of the Shankha will be reduced and impurities like organic matter on surface of conch would get eliminated. They were again thoroughly washed with hot water and dried for further use. This made the conch clean, bright white coloured, with no smell and lustre.

During marana, Fresh aloe vera pulp used for trituration, which helped to wet grind the calcium carbonate particles of Shankha smoothly, bind them easily during pellets formation and got dried in a short duration without leaving substantial inorganic residue after incineration. Modern pharmaceutical industry has been using biopolymers like chitosan, alginate or K-carrageenan and xanthan, sodium alginate and pectin as substrate to contribute crystallization of calcium carbonate. Aloe vera pulp rich in polysaccharides may have similar function of biopolymer during incineration of Shankha.

The temperature and its pattern plays a important role to transform aragonite structure of calcium carbonate to calcite form during marana process. The temperature

attained initially evaporated water and evolved gases from the breakdown of organic matrix. This makes the Aragonite free from extraneous matter and makes it easy to rearrange itself to Calcite form. The first puta breaks down the layered structure, burns out the organic matrix and evaporates water content followed by conversion of Aragonite to Calcite form. The second puta converts remaining Aragonite form to Calcite and make it more stable. Gaja puta provides optimum temperature for this conversion.

The structural and mechanical stability of conch shell was studied at 310, 500 and 900 °C (Chavan S et al, Pharmaceutical Standardization and Physicochemical Characterization of Traditional Ayurvedic Marine Drug: Incinerated Conch Shell (Shankha Bhasma). Marine Drugs. 2018; 16(11):450). At 310 °C, the low content biopolymer burned out easily, phase transformation from Aragonite to Calcite took place at 500 °C while Calcite to Lime conversion was observed at 900 °C which induced structural modification and deteriorated mechanical stability, respectively. To validate these observations, various analytical tools viz., XRD, FTIR, TGA and SEM were employed in that study. It has been reported that Calcium in Calcium carbonate Calcite form is better absorbed as compared to its Aragonite form. X ray diffraction studies of Aragonite crystal showed that Aragonite was successfully transformed to Calcite by heating above 488 °C. SEM analysis of raw conch and finished product also confirmed the structural transformation of Aragonite to Calcite. The rhomboidal structure of Calcite and a needle like shape of Aragonite was found as expected morphologies

CHAPTER EIGHT

The XRD pattern of both raw and finished Conch when simulated with standards, clearly indicated that raw conch is Aragonite in nature, while after incineration this Aragonite structure got rearranged to Calcite form. FTIR analysis of incinerated Conch showed common characteristic peaks which are more similar to CO_3^{2-} vibrations (symmetric and asymmetric) and are comparable with recent researches on Calcium carbonate nanoparticles.

This was further confirmed by TGA analysis of raw and incinerated Conch. Conch is a biogenic Aragonite containing flowing water upto 0.1–1.3% which evaporates during heating along with CO_2 evolved from the combustion of other organic material. The study showed that water seems to play significant role of making some hydrothermal conditions, where Calcite nucleation occurs thus triggering the transformation. Conch is incinerated with aloe vera pulp as an added biopolymer for complete conversion of Aragonite to Calcite. SEM analysis of raw Conch and finished product also confirmed the structural transformation of Aragonite to Calcite. The rhomboidal structure of Calcite and a needle like shape of Aragonite was found as expected morphologies.

Properties and Therapeutic Uses

Rasa	Katu, Kashaya, Kshareeya
Guna	Laghu, Sheeta
Veerya	Sheeta
Doshaghnata	Tridosha shamaka
Karma	Grahi, Balya, Varnya, Vilekhana, Agni deepana, Vishagnhna, Varnya, Hridya, Netra pushaphara
Prayoga	Amlapitta, Agnimandhya, Parinama Shula, Grahani, Yavana Pidika, Visha Dosha, Gulma, Swasa, Meha, Udara shoola, Graha dosha, Kshaya, Netraroga

Dose:

2 Ratti (250 mg).

Anupana

Ksheera, Nimbuswarasa or Sukhoshna Jala.

Formulations

1. Shankhadrava.
2. Pravalapanchamruta Rasa.
3. MahashankhaVati.
4. Agnikumara Rasa.
5. Shankha Vati.
6. Kaphaketu Rasa.
7. Agnisandipana Rasa.
8. Grahamkapara Rasa.
9. Apurvamalini Vasanta Rasa.
10. Ratnagarbha Pottali Rasa.

CHAPTER EIGHT

Research Updates

1. T. K. Sur et al, **ANTI-ULCER ACTIVITY OF SHANKHA BHASMA (CALCINED CONCH-SHELL)** Exploratory Animal and Medical Research, Vol.3, Issue -1, June,2013

   SBM (25 mg/kg and 50 mg/kg) was studied for anti-ulcer effect on ethanol induced and pylorus ligature induced model in Wistar rats. SBM showed significant anti-ulcer activity. Purified Shankha bhasma has promising cytoprotective and anti-secretary action and that may be due to its oxidative stress negating action in gastric tissue.

2. Ankit Seth et al, **Formulation Development, Characterization & Estimation Of Acid Neutralization Capacity Of Shankha Bhasma Tablets For The Treatment Of Dyspepsia,** Int J Pharm Pharm Sci, Vol 6, Issue 2, 467-469

   Shankha Bhasma was evaluated for calcium content by titrimetric analysis. The granules were prepared by wet granulation method and the flowability of granules was studied. The prepared tablets were evaluated for different parameters such as weight variation, thickness uniformity, hardness, friability, disintegration time

and acid neutralizing capacity (ANC). An effective tablet formulation was obtained using acacia and starch as a binder which had a good balance over disintegration time, hardness and friability.

3. N.K., Parthipan, **Pharmaceutico Analytical and Experimental Study of 'shankha Draavaka' W. S. R. to its Anti Secretory and Ulcer Protective Effect in Albino Rats & Spasmolytic Activity in Isolated Intestines of Albino Rabbits,** Rajiv Gandhi University of Health Sciences, ProQuest Dissertations Publishing, 2011

The results suggested that the test drug shanka dravaka possess anti secretory & acid neutralizing effect, it also possess direct spasmolytic, anti-muscarinic (antagonism could be competitive antagonism) and anti- histaminic activity as well.

Godanti (Gypsum)

The name "Gypsum" is derived from the ancient Greek word "Gypsos," which means plaster. When the Egyptians learned that Gypsum could be made into plaster by grinding it up and adding water, they used it everywhere inside their palaces, pyramids and tombs.

Synonyms

गोदन्तिका च गोदन्ता गोदन्तं कथ्यते बुधैः ॥ (R.T.11/237)

Godantika	Godanta	Pashana jateeyam
Shweta	Godantam	Soumyam

Vernacular Names

Sanskrit : Godanta
English : Gypsum
Hindi : Godanti

Mineralogical Identification

Gypsum, also known as calcium sulphate hydrate, is a naturally occurring mineral found in layers of sedimentary rock all over the world. It is formed by the evaporation and replenishment of waters containing calcium and sulphates.

Chemical composition	$CaSO_4.2H_2O$
Colour	Clear, colourless, white, often tinged other hues due to impurities- grey, yellow, red, brown
Cleavage	Perfect
Crystal system	Monoclinic
Crystal habit	Massive, flat. Elongated and generally prismatic crystals

Specific Gravity	2.3
Transparency	Transparent to translucent
Hardness (Moh's Scale)	2
Luster	Vitreous, silky, Pearly, Dull
Fracture	Conchoidal
Streak	White

Sources and Occurrence

Gypsum occurs in extensive beds associated with other evaporite minerals (e.g., anhydrite and halite), particularly in Permian and Triassic sedimentary formations. It also occurs in considerable quantity in saline lakes and salt pans as in Texas and Louisiana. Gypsum deposits occur in many countries, but Spain, Thailand, the United States, Turkey and Russia are among the leading producers. The largest Gypsum crystal was found in the Braden mine in Chile. Others of economic importance occur in U. S., Virginia, Ohio, Iowa, Kansas, Texas, Nevada, and southern California.

In India, Gypsum mining is mainly carried out in the state of Rajasthan, which contributes about 99% of the total production; the remaining 1% is contributed by Jammu and Kashmir and Gujarat.

Types

Depending on shape

1. Kanarupa 2. Talakruthi 3. Pindakruthi 4. Kousheyakruthi

According to modern mineralogy,

1. Selenite 2. Alabaste 3. Satinspar

Grahya Lakshanas

पत्राचितं सुमसृणं शरदिन्दुसुनिर्मलम्। दीप्तप्रभं तु गोदन्तं ग्राह्यमत्र प्रकीर्तितम्।। (R.T.11/238)

The characteristics of genuine Godanti are:

1. Patrachita- having many adjacent shiny layers.
2. Masruna- smooth.
3. Sardindu nirmala deeptaprabha- clean, white & lustrous like the moon of autumn season.

Shodhana

गोदन्तं निम्बुनीरेण द्रोणपुष्पीरसेन वा। यामार्ध्देनैव सुस्विन्नं विशुद्धयति न संशयः।। (R.T.11/239)

Godanti is purified by subjecting it to swedana in dolayantra with Nimbu swarasa or Drona pushpi rasa as liquid media for 1½ hour. Later, the drug inside the pottali is collected, washed with warm water, dried & stored in air tight container as shodhita Godanti.

Marana

शरावसम्पुटान्तःस्थं गोदन्तं सुविशोधितम्। म्रियते पुटितं भस्म जायते शशिसुन्दरम्।। (R.T.11/240)

Shodhita Godanti is enclosed in sharava samputa & subjected for one laghuputa. After cooling on its own, the bhasma inside the sharava which is white and beautiful like a moon is collected, triturated & preserved as Godanti bhasma till its further use.

Probable Physico-chemical changes during above processing

Same physico chemical changes can be observed as explained in of other sudhavrga dravyas shodhana.

Properties and Therapeutic Uses

गोदन्तं सुमृतं शीतं पित्तज्वरनिषूदनम्। जीर्णज्वरहरं बल्यं दीपनं श्वासकासनुत्।। (R.T.11/241)

Rasa	Katu
Guna	Laghu, Snigdha, Sheetha, Sukshma
Veerya	Sheeta
Vipaka	Katu
Doshaghnata	Vatapittahara
Karma	Balya, Deepana, Jwarahara, Kasa shwasahara
Prayoga	Shirashoola, Pittaja Jwara, Jeerna Jwara, Kasa, Shwasa, Kshaya, Urakshata, Balashosha, Pandu, Mutrakrichhra, Daha, Pradara Roga, Shweta Pradara

CHAPTER EIGHT

Dose

1 - 3 ratti (125 mg- 375 mg).

Anupana

Madhu, Godugdha, Goghrita, Mishri or Sudarshana kwatha.

Formulations

1. Godanti Bhasma
2. Trialokya Chintamani Rasa
3. Kalagnibhairava Rasa
4. Muktadi Vati
5. Balapanchabhadra Rasa
6. Shankha Dravaka Rasa
7. Swachchanda Bhairava Rasa
8. Godanti Mishrana
9. Sudhashatka Yoga

Research Updates

1. Mahantesh B. Rudrapuri et al, **Preparation of Godanti Bhasma (Gypsum) by Muffle Furnace Using Traditional Method W.S.R. Rastarangini and its Comparative Physico Chemical Analysis,** IJAHR. 2023;1(1):6-14

Godanti bhasma prepared by muffle furnace and prepared by traditional method has same tests results however their therapeutic effect on body may be different as fast acting or slow acting bhasma this need to be further studied. Both the bhasma are shown near about same analytical results but the bhasma prepared by traditional method requires more time and more labour than the Bhasma prepared by furnace method.

2. Subrata K. Das et al, **Godanti Bhasma (anhydrous $CaSO_4$) induces massive cytoplasmic vacuolation and cell survival response through stimulation of LC3 Associated Phagocytosis (LAP),** bioRxiv 2020.02.01.930594

   In the study, massive vacuolation by GB did not induce any cell death. Moreover, GB treated cells survive with massive vacuolar process, which was reversed following post-treatment with vacuole inhibitors in GB treated cells, suggesting normal vacuolar function is essential for cell survival. Treatment of cells with GB was also found to induce translocation of LC3 protein from the nucleus to vacuolar membrane, indicating LC3 associated phagocytosis (LAP) is involved in the vacuolar process. Interestingly, the LAP function was found to be reversed in the cells treated with vacuole inhibitors. The results provide a mechanistic correlation with GB induced vacuolation and associated LAP function, essential for cell survival.

3. N Dubey et al, **Toxicological and pharmacological assessment of godanti bhasma,** Asian Journal of Chemistry vol 24, No. 10 (2012)

   Godanti bhasma demonstrated significant protection of 44.72% in cold restraint stress induced gastric ulcer and 45.35% protection in dicloferne induced ulcer. TBARS of stomach in ulcer induced rat was also reduced by Godanti bhasma but serum calcium level was not altered. A significant reduction in hyperpyrexia in rat was also produced by the bhasma. The results suggest that this ayurvedic preparation possess significant gastro protective and antipyretic activity in lower doses of therapeutic range and the effect is not dose dependent.

Samudraphena (Cuttle Fish Bone)

Samudra phena (cuttle bone or cuttle fish bone) is one of the pranija sudha varga dravya. A cuttlebone is not a bone, but rather the internal shell of the Cuttle fish, a small, squid- like cephalopod. Cuttlebone is a hard, brittle internal structure (internal shell) found in all members of the family Sepiidae, commonly known as cuttle fish, within the cephalopods. It is a white brownish in colour having bright white surface. The cuttle fish is characterized by the gas-filled internal cuttlebone which actually provides buoyancy and control rather than protection. These bones wash up on shore when cuttle fish die, and they are collected by people and sold.

Synonyms:

समुद्रफेनः फेनश्च सुफेनः फेनकस्तथा। अब्धिफेनश्च फेनश्च डिण्डीरोऽब्धिकफो मतः।। (R.T.12/11)

Samudraphena	Phena	Suphena	Phenka Abdophena
Dindira	Abdikapha	Abdija	Samudraja

Vernacular Names

Sanskrit - Samudraphena
Hindi - Samudraphen
English - Cuttlefish bone
Kanwdi - Samudrada Nore

Mineralogical Identification

Cuttle bone is composed primarily of Aragonite. It contains mainly Calcium carbonate including organic and inorganic elements. This shell is mostly made of calcium carbonate ($CaCO_3$); Calcium represents 40% of its total weight. There are also other very important elements, such as Potassium, Iron and Zinc.

Chemical composition	$CaCO_3$
Colour	Whitish
Specific Gravity	2.7
Hardness (Moh's Scale)	3
Solubility	Insoluble in water
pH	9

Sources and Occurrence

Cuttle fish generally live in shallow reefs, but they can also live in channels and deeper waters up to 650 ft (about 200 m). They are distributed around the globe. The cuttle fish is mainly found throughout the oceans and seas of Europe, Africa, Asia, and Australia, Throughout its natural range, this animal exhibits a yearly migratory pattern. In the summer, it inhabits the coastal waters in tropical or temperate regions. In the winter, it migrates to the deeper water of the oceans.

Shodhana

पृष्ठास्थीन्याब्धिफेनस्य विलिख्यापनयेत्ततः। खल्वे सम्पेष्य कृत्स्नेन श्लक्ष्णचूर्णञ्च कारयेत्।।
निम्बूकस्वरसेनाथ भावयेदेकवारकम्। एवमब्धिकफः शीघ्रं शुद्धिमायात्यनुत्तमाम्।। (R.T. 12/111-112)

The outer surface of Samudraphena is scrapped to remove the adhered saline and alkaline sea sediment, and it is roughly powdered in khalva yantra. Then, bhavana is done with Nimbu swarasa for one day & dried. Later it is finely powdered and stored as shodita samudraphena.

Marana

Not mentioned in the classics.

Probable Physico-chemical changes during above processing

Scrapping makes the Samudraphena devoid of its external impurities adhered to it in the sea and bhavana will reduces its particle size. Usage of Nimbu rasa which is acidic in nature will reduces the alkalinity of the Samudraphena and also aids in breaking up of particles of Samudraphena into its fine state.

Properties and Therapeutic Uses

समुद्रफेनः शिशिरो लेखनः पाचनः सरः। चक्षुष्यो दीपनश्चैव श्रुतिस्रावहरः परम्।।
विषदोषप्रशमनः कषायः कफनाशनः। कुष्ठरोगहरोऽत्यर्थं मात्रा रक्तिद्वयोन्मिता।। (R.T.12/113-114)

Rasa	Kashaya
Guna	Laghu, Ruksha
Veerya	Sheeta
Doshaghnata	Kaphahara
Karma	Lekhana, Agni Deepaka, Pachaka, Antrottejaka, Karnasravahara, Vishaghna, Kushtaghna
Prayoga	Netrarogas, Karna Srava, Shoola, Jwara, Visha, Kushta

Dose

2 ratti (250 mg).

Anupana

Madhu, Jala.

Formulations

1. Drushti Pradana Varti
2. Vadavanala Rasa
3. Dhumaketu Rasa
4. Shankha Dravaka Rasa
5. Shukavati Varti
6. Danta Varti
7. Nayansonanjana
8. Mahanila Gutika

Research Updates

1. Sangeeta et al. **A case study on the efficacy of Samudraphena Churna in the Management of Karnasrava** (CSOM), WJPR, Vol 8, Issue 7, 2019.

   Ayurvedic line of treatment in the form of Karnapichu with Samudraphena churna gave fruitful result in the management of Karnasrava which is economical and easily available.

2. Ritika A et al, **The impact of cuttlebone availability and characterisation on its**

utilization from the traditional to pharmaceutical industry, MAY 2023 MPEDA NEWS LETTER

As a rich source of calcium and other essential components, researchers have found potential uses for cuttlebone in the pharmaceutical industry towards innovations like biomaterials, hydroxyapatite, chitin and antacid drugs from cuttlebone. And being a byproduct of waste processing, utilizing cuttlebone has the advantage of highly cost-effective and easy to implement.

Kukkutanda Twak (Hen's Egg Shell)

Kukkutanda twak is a jangama dravya and it is the hard, outer covering of an egg. After removing inner part of egg, collect the outer hard shell which is called as Kukkutanda twak. Hen's eggs are white in color, oblong in shape with tapering blunt ends. It is commonly 1 to 2 mm thick 2 to 3 inch long. It is an excellent source of organic form of Calcium and has more bio availability than that of inorganic form.

Synonyms

Kukkutanda twak	Dakshinanda twak	Dimbha

Vernacular Names

Sanskrit - Kukkutanda twak
English - Hen's Egg shell
Hindi - Ande ka chilka
Kannada - Koli motte sippe

Mineralogical Identification

An egg shell consists mostly of calcium carbonate, a common form of calcium. Egg shells consist of calcium carbonate, along with small amounts of protein and other organic compounds. It Contains 94-97% calcium carbonate, 0.3% Phosphorous, 0.2% Magnesium, Sodium copper & Iron in trace amount.

Shodhana:

The shells of hen's egg are soaked (Nimajjana) in Ushnodaka/Takra/Water mixed with Navasadara and Saindava lavana for 3-4 days. Then the internal thin membranous layer is carefully removed and dried under sun. These dry shell are stored as Shuddha Kukutanda Twak.

Marana

Shuddha Kukutanda Twak is taken in a clean khalwa yantra and powdered. To this, Changeri swarasa or Ghritakumari swarasa is added and triturated thoroughly to prepare chakrikas of even size. The chakrikas are dried under sun enclosed in sharava

samputa and subjected for one laghu puta. After self cooling, the white coloured smooth & soft Kukutanda twak bhasma is collected and stored in a suitable airtight container.

Probable Physico-chemical changes during above processing

Kukkutanda twak does not contains much impurities. Nimajjana in lavana mixed water or takra will remove its external impurities. This also softens the hard shell, helping for further pharmaceutical processing, Marana and also it potentiate its biological efficacy. As the Kukkutanda twak is not much hard, laghu puta is enough to convert the drug into fine form which is achieved after marana process, where the process of Annealing happens.

Properties and Therapeutic Uses

Doshaghnata	Kaphavatahara
Karma	Rasayana, Hrudya, Balya, Deepana, Pachana, Vajikarana, Mamsavardhaka
Prayoga	Rakta Pradara, Sweta Pradara, Somaroga, Hrudroga, Sukravikara, Prameha, Swapnadosha, Bahumutrata, Mastishka Roga

Dose

1-4 ratti (125 to 500 mg).

Anupana

Madhu, Sita, Warm water, Milk.

Formulations

1. Kukkutanda twak Bhasma.
2. Drishti prasadana Varti.
3. Muktadi Maha Anjana.

Research Updates

1. Singh et al, **Analytical profile of Kukkutanda Tvak Bhasma (incinerated hen egg shells) prepared by two different methods.** AYU, 38(3-4):p 158-164, Jul-Dec 2017.

   For KTB preparation, minimum four incineration cycles are required using EMF (Electric muffic furnace) with an average of 800°C temperature without and with cinnabar as a medium. The average particle size of KTB are 9.35 µm (KTB-A) and 9.97 µm (KTB-B). XRD reveals that raw KT is rhombohedral in nature with $CaCO_3$ (calcite) and $CaCO_3$ form, whereas both the *Bhasma* contain hexagonal CaH_2O_2 (portlandite syn) and $Ca(OH)_2$ form. SEM, FTIR, and XRD reports suggest that both samples are crystalline in nature with mixture of different organic and inorganic compounds.

2. Mayuri J et al, **Preparation and Standardization of Egg Shell Bhasma**, IJIRL Volume 8 Issue 6, November 2021

Egg shell is the rich source of calcium and converted to suitable form of administration in the form of bhasma. Standardisation of egg shell was carried out to determine quality, purity as well as safety and efficacy of egg shell. It is also used to determine the nature of adulteration. From the research work it is concluded that egg shell in the form of bhasma was safe and nontoxic form of drug and safe form of administration.

Tankana kshara (Borax)

Tankana is one among the important ksharadravya and it is grouped under Kshara traya, Kshara panchaka, Kshara ashtaka and also under Dravakagana and Mitrapanchaka. It is known antidote for the Vatsanabha visha and hence used in most of the formulations containing Vatsanabha.

Synonyms

टङ्कणष्टङ्कनश्चैव टङ्कष्टङ्गश्च टङ्गणः। द्रावकष्टङ्कणक्षारष्टङ्कक्षारश्च कथ्यते।।
रङ्गक्षारस्तथा रङ्गो रङ्गदो लोहशोधनः। लोहशोधनकश्चापि कीर्तितः स्वर्णशोधनः।।
सौभाग्यश्च सितक्षारः श्वेतक्षारश्च टङ्कः। क्षारराजश्च कथितो रसायनविशारदैः।। (R.T.13/72-74)

Tankana	Tanka	Dravaka	Rasaghna	Tankakshara
Rangakshara	Ranga	Rangada	Lohashodhana	Lohasleshanaka
Swarnashodhana	Soubhagya	Sitakshara	Shwetakshara	Tangaka
Tangana	Kshararaja	Lohadravi	Ksharashreshta	Rasakshara

Mineralogical Identification

Borax is the common name for the chemical sodium tetraborate. It is a salt of boric acid. Powdered borax consists of soft white crystals that dissolve in water. Naturally occurring borax is translucent due to water in its structure, but develops a white powder on its surface as the water evaporates.

Chemical composition	$Na_2B_4O_7$ $10H_2O$
Colour	Colorless, Green, Gray, Gray white, Blue
Cleavage	Perfect
Crystal system	Monoclinic - Prismatic
Crystal habit	Massive, Prismatic and Tabular - Form
Specific Gravity	1.7-1.72
Transparency	Translucent to opaque

Hardness (Moh's Scale)	2-2.5
Luster	Greasy (Oily)
Fracture	Brittle -Conchoidal
Streak	White
Melting point	743°C
Boiling point	1,575°C
Refractive Index	1.447-1.472

Sources and Occurrence

Borax is a form of hydrous sodium borate that occurs from the evaporation of saline lakes. It is also synthesised as a by product of borate deposit mining. Borax is distributed in places like Ladakh district of Kashmir, Tibet, China, Turkey, Kazakhistan, Argentina, Borax Lake in California and New Mexico. Rather than procuring it naturally, it is extensively prepared artificially in the laboratory.

Types

Tankana is said to be of 2 types:

1. Tankana- White colour- Samanya.
2. Neelakanta Tankana- Blue colour- Shreshta.

Two types of Tankana are available in market :

1. Sonarisuhaga- White colour, Kshariya and madhurarasa yukta, appears like Pearls, used for both therapeutic usage and Dhatudravana.
2. Choukiyasuhaga- Yellow colour, devoid of Madhura rasa, available as small pieces, used only for therapeutic purpose.

Ashuddha Tankana Sevanajanya Dosha : A.P.2/244

By injestion of Tankana which is not properly purified, it leads to:

1. Vanti (Vomiting). 2. Bhranti (Illusion).

So purification of Tankana has to be done by roasting in fire.

Nirmalikarana

R.T.13/75-76

1 part of powdered Tankana is added to 24 parts of clean water and dissolved. Later the solution is filtered and filtrate is heated over the fire till the water content evaporates. Heating is stopped when little water content is left behind in the filtrate which is then dried completely under sun. This process is called Tankana nirmalikarana.

Shodhana

सुचूर्णितं टङ्कणं तु खलु पञ्चपलोन्मितम्। समुज्ज्वलोदरे क्षुद्रकटाहे विन्यसेत्ततः।।
चुल्लिकायां निधायाथ पचेद् दर्व्या प्रचालयन्। सुपुष्पितं नष्टनीरं शुद्धिमायाति टङ्कणम्।। (R.T.13/77-78)

5 pala (250 gms) of Tankana has to be coarsely powdered and taken in the iron vessel having wide mouth. The vessel placed over the stove and heated by continuous stirring with the darvi till the water content evaporates and it blooms like a flower (like popcorn). By this, Tankana will become Shuddha and can be used for therapeutic purposes.

Probable Physico-chemical changes during above processing

During Bharjana of Tankana the chemical compound of borax changes into an amorphous form from crystalline form. Dry frying removes the unwanted moisture content and volatile matter. Bharjana also makes Tankana light, puffed and fine.

Properties and Therapeutic Uses

Guna	Ushna, Rooksha, Teekshna, Sara
Veerya	Ushna
Doshaghnata	Vatakaphaghna, Pittakara
Karma	Kaphadravaka, Hridya, Balya, Dhatu shodhana, Dhatu dravana, Moodagarbhapra vartaka, Artavajanaka, Vishaghna, Parada vikaranashaka
Prayoga	Sthavaravisha, Asmari, Atisara, Kasa, Shwasa, Admana, Vrana

CHAPTER EIGHT

Dose

1 - 2 Ratti (125-250 mg).

Anupana

Madhu, Ghrita, Roganashaka swarasa and kwatha.

Formulations

1. Anandabhairava rasa.
2. Kaphaketu rasa.
3. Kanakasundara rasa.
4. Trailokyachintamani rasa.
5. Gaganasundara rasa.
6. Sarvangasundara rasa.
7. Mrutyunjaya rasa.
8. Pratapamartanda rasa.
9. Udakamanjari rasa.
10. Sannipatabhairava rasa.

Research Updates

1. Srinivasulu B et al, **Physico-Chemical Standardization of Tankana (Borax): An Ayurvedic Mineral Drug,** Vol. 1 No. 6 2012, pharma journal

The raw Tankana contains $Na_2B_4O_7 \cdot 10H_2O$ (structure- Rhombohedral), $Na_2B_4O_7 \cdot 5H_2O$ (structures- Orthorhombic), and purified Tankana contains $Na_2B_4O_7 \cdot 5H_2O$ (structures- Orthorhombic) by the XRD method. Scanning Electron Microscope (SEM) studies showed that Tankana was uniformly arranged in agglomerates of size 10 microns as compared to the raw Tankana which showed an arrangement of grains of size 3 microns. Quantitative chemical analysis showed that Purified Tankana contains more Boran (13.48%) compared to raw Tankana (10.08%).

2. Dr. Pavithra et al, **Pharmaceutical Development Of Modified Tankana Malahara- An Ointment Preparation,** IRJAY, August: 2020 Vol-3, Issue-8; 241-250

In the study, it has concluded that modified tankana malahara prepared with 1:2 ratio of tankana and siktha taila would be beneficial for therapeutic purpose which has to be confirmed by further analytical and clinical study.

3. Sadhana Parajuli et al, **Effectiveness of Tankana Bhasma Kavala in Tonsilitis.** J Ayurveda Integr Med Sci 2021;1:80-83.

Tankana Bhasma Kavala have resulted in clinically improvement in the symptom of Tonsilitis. There was a improvement in Redness by 76.47%, Dysphagia by 72.22%, Swelling by 50%, White pus by 50%, Pain by 75% in the duration of 15 days

Discussion

Rasashastra is one of the most important branch of Ayurveda dealing with the preparation of Ayurvedic medicines by different methods, using metals & minerals in pure form. Along with Parada (Mercury) drugs from plant origin, animal origin, oceanic products are also used to prepare potent medicine. Various minerals and organic poisons mentioned under various groups: Rasa, Maharasa, Uparasa, Sadharana Rasa, Ratna, Upratna, Visha, Upvisha. All these substances were used by the Acharyas for the experimentations on Mercury. These drugs are also found to be effective in therapeutics when they used after processing.

A distinct principle of producing a drug, compatible with human body, is observed in the processing of mineral substances. The mineral or metallic material is treated with plant or animal substances, compatible with the body. However in such cases the ultimate object of the processing is to produce an assimilable product for the human body, without producing harm in therapeutically effective dose. This treatment makes the processed material compatible and facilitates its easy assimilation.

The first obstacle in consumption of mineral material by the humans is its non-edibility due to its hard consistency. Hence the mineral material is vigorously processed to make it physically soft, edible and assimilable. Apart from this, the material is also processed to make it harmless to the body, in other words, to make it free from toxicity in therapeutic doses. Among various rasa dravyas, Abhraka, Makshika, Gandhaka,

Hingula, gold, lead and copper, etc. are found to more useful for therapeutic purposes as well as processing of Parada. So these drugs are considered under the category of 'Must to know'. Therefore, these drugs need to be studied in detail with scientific approaches in all fields, such as identification, purification, other processing, probable physico chemical changes etc. so in this chapter, deep and thorough knowledge of these drugs are dealt with.

Conclusion

The specific branch of Ayurveda i.e. Rasashastra deals with processing and utilization of metals/minerals based formulations. Rasa dravyas which are more useful for therapeutic purposes and processing of Parada has to be studied in its multiple facets and mere detail study of these drugs are essential for their application in pharmaceutical and therapeutic aspects.

Extended learning

- Enlist synonyms of Rasadravya and explain significance of these synonyms
- Discuss probable physical, chemical changes occurring during process & after Shodhana and Marana of Parada and other Rasadravya
- Research updates about Parada and other Rasadravya
- Develop checklist for identification of genuine rasadravyas

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MODEL QUESTIONS

Long answers

- Briefly describe about Parada, Write the Synonyms, Occurrence, natural and artificial sources of Parada and explain Hingulottha parada.
- Mention the Parada Doshas according to Rasa tarangini and explain the methods to overcome it.
- Discuss the Grahya-Agrahya qualities of Parada and Parada gati and their importance.
- Define Parada bandha and explain any 4 Bandhas.
- Describe the importance and method of Shodhana of Parada and Sanskara.
- What is Parada sanskara and brief description of first four Parada Sanskara and Explain the changes in Parada after every Sanskara.
- Write names of parada ashtakarma. Describe any 3 sanskara with reference to drugs, yantra, process & importance.
- Mention Maharasa. Explain types, Grahya lakshana, Shodhana and Marana of Makshika
- Briefly describe the occurrence, Synonyms, Minerological identification, Sources, Types, Grahya and Agrahyata, Shodhana, Marana and other processing techniques. Properties, dose, anupana and therapeutic uses, pathya– apathya and ashuddha, apakwa and avidhee sevanjanya doshaand its management, important formulations of Abhraka.
- Write classification of Dhatuvarga. Explain Paryaya, Bheda, Shodhana,Marana and Gunakarma of Loha in detail.
- Describe Shankha with reference to Synonyms, Types, Grahya Lakshana, Shodhana, Marana, Matra, Upayoga and four Yogas.

Short answers

- Write the Synonyms of Parada and their nirukti.
- Describe the Occurrence, natural and artificial sources of Parada.
- Describe the method of Hingulottha parada.
- Briefly describe the Parada gati.
- Mention types of Gandhaka and explain the method of Gandhaka Shodhana.
- Mention Navaratanas. Explain Shodhana and Marana of Muktha.
- Complete the verse and Explain it : लोहानांमारणश्रेष्ठं.....।
- Describe the Ashuddha, and Avidhee Sevanjanya Dosha and Shodhana of Manahshila (Realgar)
- Describe the Synonyms, identification, Sources, Grahya and Agrahyata of Tamra (Copper)

- Describe thrividha paaka of loha dhatu.
- Heeraka shodhana & marana process.
- Dhanyabraka Nirmana Vidhi and its significance.
- Pancha Samskara of Abraka.
- Grahya Lakshanas and chemical composition of Haratala.
- Mention Tamra Doshas and write their eradication method.
- Tamra Marana and Amritikarana.
- Name Puthi lohas and explain Naga Jarana.
- What is Mandura? Write its Shodhana and properties.
- Mention types of Pravala and its Shodhana.
- Origin, Shodhana and uses of Mukta.
- Define Ratna and mention them. Write Shodhana and Pisti of Pravala.
- What is Samudraphena. Write its sources and occurrence
- Describe the shodhana and marana of Kukkutanda twak
- Write the minerological identification and shodhana of Tankana.

CHAPTER 9

RASA DRAVYA PARICHAYA – II

PAPER 1

Contents

Synonyms, mineralogical identification, sources, types, grahya and agrahyata, shodhana, marana and other processing techniques with probable chemical reactions, yoga, research updates of

Sasyaka (Peacock ore), Kaseesa (Green Vitriol), Gauripashana (Arsenic oxide), Trinakanta, Akika (Agate), Sudha (Lime stone), Khatika, Ajashthi, Jaharmohara (Serpentine), Dugdhapashana (Talc)

Learning outcome

At the end of this chapter, Students can able to

1. Enlist the important synonyms of Rasadravyas
2. Explain classical & Minerological identification and their Sources.
3. Elaborate types, Grahya-Agrahyata and Dosha of Sasyaka, kasisa and Akika
4. Explain Shodhana, Marana & and other processing techniques with probable chemical reactions.
5. Enlist important kalpas prepared from respective dravya. Describe therapeutic importance of that Rasadravya

Sasyaka (Peacock Ore)

Introduction

Sasyaka is one among mineral drug of Maharasa. Probably, due to the less availability of sasyaka during those times, there is a mention of its artificial preparation. This synthetic form is termed as Tuttha or Mayuratuttha, as mentioned by Rasajalanidhi. But in practice, both the names are used as synonyms.

Synonyms

तुत्थं तु तुत्थकं तुत्थाञ्जनञ्चापि मयूरकम्। सस्यकं ताम्रगर्भञ्च शिखिग्रीवञ्च तन्मतम्।। (R.T.21/71)

Tuttham	Tutthakam	Tutthanjana	Mayurakam	Sasyakam
Tamragarbha	Shikhigriva	Musha	Amritasanga	Drishyam
Mayurtuttham	Neelam	Neelashmajam	Tutthakarpara	

Vernacular Names

Sanskrit : Tuttham

English : Copper Sulphate, Blue Vitriol, Chalcanthite and peacock ore

Hindi : Nilatotha, Tutiya

Kannada : Mayur Tuttha, Maila Tuttha

Latin : Cupri sulphas

Minerological Identification

Copper sulphate is the most important salt of copper. It usually crystallizes as $CuSO_4$. $5H_2O$ and has a bright blue colour. It is prepared by the treatment of copper oxides with sulphuric acid.

Properties

Chemical composition	$CuSO_4$ $5H_2O$
Colour	Bright and deep blue
Luster	Vitreous
Crystal habit	Orthorhombic, Triclinic
Cleavage	Poor (basal)
Specific Gravity	Approximately 2.2-2.3
Diaphaneity	Transparent to translucent
Hardness (Moh's Scale)	2.5
Fracture	Conchoidal
Streak	Pale blue to colourless

Sources and Occurrence

Tuttha is obtained from two sources i.e., mineral and artificial. In India, mineral sources are found mainly in Bihar and Rajasthan. Other than India, its mines are found in Sweden, Germany, Spain, France and UK. Nowadays, a large proportion of Tuttha is prepared artificially for commercial use and is widely available. It is prepared in chemical industries at Surat, Calcutta, Amritsar, Varanasi and other places.

CHAPTER NINE

Types:

तुत्थे द्वे इति मयूर तुथं खर्परिका तुत्थं च । (Cha.Chi 7/108) [chakrapani commentary]

According to Charaka, Tuttha is of two types:

1. Mayur tuttham 2. Karparika tuttham

As per Rasajalanidhi,

'सस्यकं हि स्वभावजं तुत्थकं कृत्रिमं मतम्। एकाभावे परं ग्राह्यं नात्र कार्या विचारणा' ।। (R.J.N)

Based on the Source, Tuttha is of 2 types:

1. Swabhavaja : Sasyaka
2. Kritrima : Tutthaka

Any variety can be used in the absence of another

Based on the Colour, 2 types:

1. Rakta - Shreshta
2. Kalika - Adhama

Grahya Lakshana

मयूरकण्ठसच्छायं भाराढ्यमतिशस्यते। (R.R.S.2/126)

शिखिकण्ठसमच्छायं गुरु स्निग्धं महोज्ज्वलम्। तुत्थकं शस्यते विज्ञैरन्यद्धीनगुणं मतम्।। (R.T.21/72)

Good quality of Tuttha should posses following characteristics.

1. Shikhikanta samacchaya- having the complexion of the peacock neck.
2. Guru- Heavy.
3. Snigdha - Smooth and soft.
4. Mahojjwalam - Bright and Shining.

Ashuddha, Apakwa and Avidhee Sevanajanya Dosha

वान्तिं भ्रान्तिमशुद्धं तत् कुरुते, शोधितं शुभम्। (A.P.4/39)

Ashodhita Tuttha Causes

1. Vanti (Vomitting)
2. Bhranti (Giddiness)

So it should be used after shodhana only.

Shodhana

I Method

सस्यकं शुद्धिमाप्नोति रक्तवर्गेण भावितम्। स्नेहवर्गेण संसिक्तं सप्तवारमदूषितम्।। (R.R.S.2/129)

Sasyaka will get purified by subjecting it to Bhavana with the swarasa or the kwatha of the Rakta varga dravyas for 7 times or washing it thoroughly or boiling in the Sneha varga dravyas for 7 time.

II Method

तुत्थं विचूर्ण्य खल्वे नवनिम्बुकोत्थवारा। परिपेषयेद् द्वियामं रसतन्त्रकर्मविज्ञः।। (R.T.21/106)

Ashuddha Tuttha is powdered in Khalva yantra and subjected it to trituration thoroughly with Nimbu Rasa for 6 hours. This will purify the Tuttha and can be used for therapeutic purpose or further pharmaceutical processing.

S.No.	Drugs used	Method of Shodhana	Reference
1	Raktavarga dravya Rasa/Kwatha	7 Bhavana	R.R.S.2/129
2	Sneha varga dravyas	Samsikta (washing thoroughly/boiling) for 7 times	R.R.S.2/129
3	Gomutra/ Mahisha mutra/Aja mutra	Swedana in Dolayantra for 9 hours	R.R.S.2/130

4	Nimbu Rasa	Bhavana for 6 hours	R.T.21/106
5	Rakta chandana and Manjishta kashaya	7 Bhavana with each liquid	R.T.21/108
6	Any Amla varga drava	7 Bhavana	R.T.21/112

Marana

I Method

लकुचद्रावगन्धाश्मटङ्कणेन समन्वितम्। निरुध्य मूषिकामध्ये म्रियते कौक्कुटैः पुटैः।। (R.R.S.2/131)

Equal quantity of Shuddha Tuttha, Shuddha Gandhaka and Shuddha Tankana is taken in khalwa yantra and triturated with Lakucha Swarasa. Later the mixture is dried, confined to crucible and subjected to Kukkuta Puta. The entire procedure is repeated for 3 times or till the bhasma siddhi lakshana appears. This will yield the appropriate Tuttha bhasma.

II Method

पलोन्मितं तुत्थकं तु गन्धकन्तु पलार्द्धकम्। शरावसम्पुटे न्यस्य मृदा च परिलेपयेत्।
पुटत्रयं प्रदातव्यं स्वल्पैरेव वनोत्पलैः। तुत्थकं मृतिमाप्नोति वान्तिभ्रन्त्यादिवर्जितम्।। (R.T.21/125-126)

One part of Shodhita Tuttha is triturated with ½ part of Shodhita Gandhaka, enclosed the mixture in Sharava samputa and subjected to Laghu puta. The entire procedure is repeated for 3 times or till the bhasma siddhi lakshana appears to yield the proper Tuttha bhasma which is devoid of any untoward effects like Vanti, Branti and others.

S.No	Drugs used	No. and Type of Puta	Reference
1	Shuddha Gandhaka and Shuddha Tankana; Lakucha swarasa for bhavana	Kukkuta puta	R.R.S.2/131
2	½ part of Shuddha Gandhaka	Laghu puta	R.T. 21/125-126

Probable Physico-chemical changes during above processing

Trituration is a process, which allows effective combination of different constituents of a particular preparation and divides it into finest particles, thus increasing its assimilative power and therapeutic effect. Bhavana makes the particles finer by 'Sanghatha Bhedana' effect. It potentiate the Dravya and in augmentation of different types of therapeutic Values. Nimbu swarasa is used as Bhavana dravya, this helps in the addition of useful components to the prepared drug as observed in the elemental composition in EDXRF analysis.

Properties and Therapeutic Uses

तुत्थकं लेखनं भेदि कषायं मधुरं लघु। क्रिमिघ्नमथ चक्षुष्यं मेहमदाहरं परम्।।
कफपित्तहरं बल्यं शूलहृत्कुष्ठनाशनम्। श्वित्रापहं त्वाम्लपित्तहरं चैव रसायनम्।।
तुत्थं सङ्कोचनकरं नाडीनां बलकृत् परम्। त्वग्दोषशमनं कामं विशेषाद्रुचिरं मतम्।। (R.T.21/127-129)

Rasa	Madhura, Kashaya
Guna	Laghu, Khara, Vishada, Ushna
Veerya	Sheeta
Vipaka	Katu
Doshaghnata	Kaphapitta hara
Karma	Lekhana, Bhedana, Vamaka, Krimighna, Chakshushya, Medohara, Rasayana, Nadi Balakara, Twakdoshahara, Sankochanakara, Ruchikara Vishaghna and Shoolahara.
Prayoga	Kushta, Amplapitta, Switra, Vrana, Arsha, Prameha, Medoroga, Krimiroga, Vibandha, Hridroga,

Dose:

गुञ्जाष्टमांशतो गुञ्जपादिकं तुत्थकं मृतम्। तत्तद्भेषजयोगेन वीतशङ्कः प्रयोजयेत्।। (R.T.21/130)

Tuttha can be administered in the dose of ¼th to ⅛th Ratti (15-30 mg).

Anupana

Madhu, Tambula patra Swarasa, Vidanga and Ghrta.

Management of Ashuddha, Apakwa and Avidhee Sevanajanya Dosha of Tuttha

जम्बीररसमादाय यः पिबेच्च दिनत्रयम्। तस्य तुत्थकशान्तिस्यात्तद्वल्लाजेन वारिणा।। (B.R.R.S)

The ill effects caused by the Ashuddha, Apakwa and Avidhee sevana of Tuttha can be pacified by the administration of Jambira rasa or Laja manda for 3 days.

Satwapatana

निम्बुद्रवाल्पटङ्काभ्यां मूषामध्ये निरुध्य च। ताम्ररूपं परिध्मातं सत्त्वं मुञ्चति सम्यकम्।। (R.R.S.2/134)

Shudhha Tuttha taken along with Shuddha Tankana in Khalwa yantra and triturated with Nimbu Rasa and dried. Dried powder is enclosed in Musha and subjected to intense heat. By this, the satwa in the form of Copper will be extracted out from Tuttha.

Pathya-apathya

Pathya- Shali, Godhuma, Mudga and Ghrita.

Important Formulations

1. Garudanjana
2. Jatyadi Ghrita
3. Lokanatha Rasa
4. Nityananda Rasa
5. Jatyadi Taila
6. Tuttha Drava
7. Tuttakadya Varti
8. Udarari Rasa
9. Tutthamrta Malahara
10. Shikhigrivadi Varti

Research Updates

1. M. Neeralagi, Rajashekhar, **Physico-Chemical Analysis and Evaluation of antibacterial and antifungal activity of Sasyaka bhasma",** PG dissertation, Rajiv Gandhi University of Health Sciences (India) Pro Quest Dissertations Publishing, 2010

   AAS reveals the presence of Cu, Fe & S in Raw, Shodhita & Sasyaka bhasma. Mg & K present in Shodhita & Bhasma. Copper and Ferrous % increased in Bhasma than Raw. The mean particle size was 6.26 µm. XRD has shown Monoclinic, Tetragonal, Face Centered Cubic and Orthorhombic crystal structures. Sasyaka Bhasma with 10%, 20% & 100% solutions have shown significant zone of inhibition against bacteria & fungi than Benzathine penicillin, Flucanazole & control. Sasyaka Bhasma has demonstrated significant antibacterial and antifungal activity than standard drugs.

2. Vijaykumar S Kotrannavar et al, **Evaluation of Anti bacterial Activity of Tuttha Drava,** Indian Journal of Ancient Medicine and Yoga Volume 11 Number 4, October -December 2018

   Antibacterial study revealed that Tuttha Drava shows good minimum inhibitory concentration effect on Pseudomonas aeruginosa, Staphylococcus aures, while less Minimum inhibitory concentration effect on streptococcus pyogens.

3. Chaitanya, O. **Pharmaceutico-Analytical Study of Tutthakadyamalahara and It's Comparative Anti-Bacterial Study with Mupirocin,** PG dissertation, Rajiv Gandhi University of Health Sciences (India) Pro Quest Dissertations Publishing, 2014.

   Tutthakadya malahara has best anti- bacterial activity. Tutthakadya Malahara has shown significant activity for both staphylococcus aureus and streptococcus pyogens like the standard drug Mupirocin in the minimum concentration (20 mg). Tutthakadya Malahara has shown more activity on staphylococcus aureus than streptococcus pyogens.

4. Anita Panda, **"Analytical study of Tuttha bhasma prepared with three different marana procedures and its clinical efficacy in Switra roga"-** PG dissertation, Rajiv Gandhi University of Health Sciences (India)

   Tuttha Bhasma prepared by 3 different methods are effective in the treatment of switra, where in Tuttha Bhasma prepared with Gandhaka, administered with Bakuchi is better in reducing the Switra hypo pigmented lesions followed by Tuttha Bhasma prepared with Gandhaka and Tankana and Tuttha Bhasma prepared with Nimbu swarasa. The percentage of copper, Iron, Sulphur were highest in Tuttha Bhasma II prepared with Gandhaka hence may be better in improving clinical condition safely.

Kaseesa (Green Vitriol)

Synonyms

काशीशकञ्च कासीसं पुष्पकासीसकन्तथा। पांशुकं पांशुकासीसं खगाख्यञ्च प्रकीर्तितम्।। (R.T. 21/227)

Kashisha	Kasisa	Pushpa kasisa	Pamshukam	Panshukasisa
Khaga	Dhatukasisa	Dhatu Ranjaka	Khechara	Ayogandhamla

Vernacular Names

Sanskrit : Kasisa

English : Greenvitriol, Sulphate of iron

Hindi : Haratutia, Kasis, Hira

Kannada : Annabedi.

Minerological Identification

Ferrous sulphate is also known as Green vitriol. It appears as a greenish crystalline solid, odorless and has a saline, astringent taste. In moist air crystals of ferrous sulphate rapidly oxidize and become coated with a brownish yellow basic ferric sulphate and must then not be used for medicinal purposes

Properties

Chemical composition	$FeSO_4$
Colour	Green, broken white [anhydrous]
Luster	Vitreous
Crystal habit	Orthorhombic, Monoclinic
Cleavage	Perfect
Specific Gravity	1.8 -1.9
Diaphaneity	Transparent to translucent.
Hardness (Moh's Scale)	2
Fracture	Conchoidal
Streak	Uncoloured, white

Sources and Occurrence

It is found in native form as well as made artificially. It is prepared artificially by the reaction of Sulphuric acid on Iron. It is available naturally resulting from decomposition of Iron pyrites by the action of atmospheric moisture and found where iron pyrite occurs. It is available naturally in USA, Germany, Bavaria, Sweden, Spain and in India, Bihar, Punjab, Orissa and Uttar Pradesh.

Types

कासीसं बालुकाद्येकं पुष्पपूर्वमथापरम्। (R.R.S.3/51)

According to R.R.S., Kasisa is of 2 types:

1. Valu kasisa 2. Pushpakasisa

According to Rasarnava, Kasisa is of 3 types:

1. Shukla 2. Krishna 3. Peeta

Based on colour, it is of 4 types according to Ananda kanda:

1. Peeta 2. Krishna 3. Sita 4. Rakta

According to R.J.N., Kasisa is of 4 types:

1. Shweta- Valu kasisa
2. Peeta- Pushpa kasisa
3. Harita- Kritrima kasisa
4. Shyama- Dhatu kasisa

According to A.P., Kasisa is of 3 types:

1. Kasisa 2. Dhatu Kasisa 3. Pushpa Kasisa

Grahya Lakshana/Swaroopa

चूर्णकासीसकं श्वेतमीषत्पीतञ्च कीर्तितम्। पुष्पकासीसकं स्वच्छहरिद्वर्णं प्रकीर्तितम्।। (R.T.21/229)

Churna Kasisa is white or yellowish in colour, whereas Pushpa Kasisa is green in colour.

Shodhana

CHAPTER NINE

I. Method

सकृद्भृङ्गाम्बुना क्लिन्नं कासीसं निर्मलं भवेत्। (R.R.S.3/54)

Kasisa is purified by soaking it in Bhringaraja swarasa or triturating it with Bhringaraja swarasa.

II Method

सकृद्भृङ्गाम्बुना स्विन्नं कासीसं निर्मलं भवेत्। (A.P.2/275)

By subjecting the Kasisa to swedana in Dola yantra with Bhrngaraja swarasa for 3 hours, Kasisa will become shuddha.

S.No.	Drugs used	Method of Shodhana	Reference
1	Bhrngaraja swarasa	Soaking/Bhavana	R.R.S. 3/45
2	Pitta of animals or Stree raja	Soaking/Bhavana	R.R.S. 3/45
3	Bhrngaraja swarasa	Swedana in Dolayantra for 3 hours	A.P. 2/275 R.T. 21/230
4	Jambeera swarasa	Bhavana and drying in sun for a day	B.R.R.S

Marana

I. Method

काञ्जिकेन तु विभाव्य सप्तधा शोषयेत्खगमिनांशुभिर्बुधः।
संपुटेऽञ्च लघुना पुटेन तत् स्याद्धि भस्म खलु लोहितप्रभम्।।
समादायाथ तद्भस्म पेषयेन्निम्बुकद्रवैः। चक्रिकाः कारयित्वा च पुटेल्लघुपुटे पुनः।।
यावन्निरम्लं तद्भस्म तावदेवं पुनः पुनः। निम्बुकोत्थै रसैर्वैद्यः पिष्ट्वा संशोष्य सम्पुटेत्।। (R.T.21/255-257)

Shodita Kasisa is triturated with kanji for 7 times, chakrikas are prepared, dried and subjected for laghu puta. This will yield raktavarna bhasma. This obtained bhasma is triturated with nimbu rasa, chakrikas are prepared, dried and again subjected to laghu puta. This procedure is repeated till the bhasma becomes Niramla (free from sour taste). Each time before subjecting it to puta, Rasavaidya should triturate with nimbu swarasa, dried and enclosed in Sharava samputa.

S.No	Drugs used	No. and Type of Puta	Reference
1	Kanji -for bhavana (7 times) Nimbu rasa- bhavana	Laghu puta (till niramlikarana)	R.T. 21/255-257
2	Snuhi patra rasa/ Snuhi ksheera- Bhavana	Laghu puta (till niramlikarana)	R.T. 21/259
3	Nimbu rasa- bhavana	Laghu puta	Rasamruta

Probable Physico-chemical changes during above processing

Acharya Charaka described the properties of Amla Rasa as Mukham Apakarshayathi, Kledayathi and Jarayathi. Amlarasa having dissociative property softens the drug due to its Mukham Apakarshayathi property, Amla Rasa having capacity to open minute poses of the drug by its Teekshna Guna to remove the impurity. Due to the Jarana, Teekshnatva, Kshalana properties of Amla Rasa, Nimbu rasa helps in reduction of hardness, particles size and to develop brittleness in Kaseesa.

Properties and Therapeutic Uses

कासीसद्वयमम्लोष्णं तिक्तं च तुवरं तथा।
वातश्लेष्महरं केश्यं नेत्र्यं कण्डूविषप्रणुत्।।
मूत्रकृच्छ्राश्मरीश्वित्रनाशनं परिकीर्तितम्।। (A.P.2/274-275.)

Rasa	Amla, Kashaya, Tikta
Guna	Snigdha, Guru, Rooksha
Veerya	Ushna
Vipaka	Katu
Doshaghnata	Vata Kapha hara

Karma	Keshya, Netrya, Kanduhara, Visapaha, Switraghna, Kesharanjana, Raktaranjana, Rajapravartaka, Balya, Jwaraghna, Pleeha roganashaka, mukharogahara, Rasayana, Deepana, Vrana shodhana and ropana. Externally- Sankochakara
Prayoga	Mootrakrchra, Asmari, Panduroga, Switra, Visha, Vrana, Kshaya, Netraroga, Agnimandya, Krimi, Jwara.

Dose

गुञ्जार्द्धतः समारभ्य रक्तिकाद्वितयोन्मिता। कासीसकस्य कथिता पूर्णमात्रा भिषग्वरैः॥ (R.T.21/242)

Dose of Shodhita Kasisa is ½ - 2 ratti (62-250 mg).

For Kasisa Bhasma, Loha bhasma samana matra is indicated.

Anupana

Triphala churna, Madhu

Satwapatana

तुवरीसत्त्ववत्सत्त्वमेतस्यापि समाहरेत्। (R.R.S.3/55)

क्षाराम्लैर्मार्दिता ध्माता सत्त्वं मुञ्चति निश्चितम्। (R.R.S.3/65)

The satwa of Kasisa can be obtained by adopting the similar process of Tuvari (Sphatika) Satwapatana, i.e. it should be triturated with Kshara and Amla dravyas and heated intensively to obtain satwa.

Important Formulations

1. Kasisadya Taila
2. Kasisadi Gutika
3. Rajah pravartini Vati
4. Switrari Rasa
5. Loha Rasayana
6. Panchanana Rasa
7. Kumarika Vati
8. Plihari Vati
9. Ekatrisanga Varti
10. Rasa Pushpa

Research Updates

1. Dr. Ashwin Ashok Shete et al, **Clinical study of Kasisabhasma and Annabhedi chenduram with reference to Hb%**, The Pharma Innovation Journal 2019; 8(1): 285-289

   Kasisa has pronounced efficacy in treating Pandu. The effect of these two medicines has been studied restricting it to Hb deficiency anemia. The individual response to the each group has been statistically significant and when compared in between the Kasisa bhasma and Annabhedi chenduram, the effect of Kasisa bhasma is found highly significant.

2. Jose, Soumya, **A Comparative Pharmaceutico-Analytical and Clinical Study of**

Bhringaraja Shodhita and Jambira Shodhita Kasisa Bhasma in Pandu Roga W.S.R to Iron Deficiency Anaemia- PG dissertation, Rajiv Gandhi University of Health Sciences (India) Pro Quest Dissertations Publishing.

In analytical study, pH of all the 4 samples were acidic,showed high in ash value and very low in loss on drying value. Test for Iron shows that Bhringaraja shodhita Kasisa Bhasma having more iron content of 40.97% than other Bhasma. XRD study reveals that analytically both the samples have similar peaks inferring the same chemical compound Fe_2O_3. The XRF study shows that in 4 samples Fe_2O_3 and SO_3 are the major elements. During clinical study it is proved that Bhringaraja Shodhita Kasisa Bhasma is more beneficial than Nimbu swarasa Shodhita Kasisa Bhasma in treating Panduroga.

3. S. N. Upadhyay et al, **Toxicological evaluation of Kasisa bhasma, an ayurvedic organometallic preparation**, IJRAP 3(3), May-Jun 2012

In female rats, treated with 22.5 mg/kg/day, 112.5 mg/kg/day and 225 mg/kg/day showed significant decrease of SGPT level, Eosinophil count and Prothrombine time respectively, whereas males treated with 225 mg/kg/day showed significant decrease of total protein. Moreover, there were no changes observed in histopathological evaluation of the high dose group animals when compared to control group, which revealed that there was no adverse effect of Kasisa Bhasma, the classical Ayurvedic Organo-metallic preparation in oral consumption in Wistar Rats for 28 consecutive days of study.

4. Tukaram Lambani, **"Pharmaceutico-Analytical and Experimental study to evaluate Anti- hyperglycaemic activity of Kaseesa bhasma"-** PG dissertation, Rajiv Gandhi University of Health Sciences (India)

Chemically Kaseesa is identified in the state of ferrous oxide state Fe_2O_3. In Experimental study, Kaseesa Bhasma and Jambu Beeja Choorna was effective in treating in Diabetes induced albino rats.

Gauri Pashana (Arsenic Oxide)

Gauripashana is the second mineral drug of Sadharana rasa. It is one among the Arsenic compound and said to be more poisonous. So administered in a very small dosage after proper processing. It is also an important drug for Parada processing.

Synonyms

शङ्खभूषं शङ्खविषं गौरीपाषाणकं तथा।
दारुभूषं दारुभूषा दारुभोचश्च मल्लकः।।
फेनाश्मभस्मसंज्ञश्च सोमलः सम्बलं तथा।
आखुपाषाणकं चैव रसज्ञैः परिकीर्तितम्।। (R.T.11/130-131)

Shankhamusha	Shankhavisha	Gauripashana	Darumoosham	Darumooshaa
Mallaka	Phenashmabhasma	Somala	Sambala	Aakhupashana
Darumocha	Hatachoornaka	Malla	Mushaka	Peeta
Phenashma	Sumbalakhara	Talasatwa	Ullipashana	Vikata

Nirukti

"Mallati dharati balamiti"

Malla is the one which does baladharana, is strong, robust, to hold, Excellent.

Vernacular Names

Sanskrit - Gauripashana

Kannada - Shankha pashana.

English - White Arsenic or Vitreous or Rat poison

Hindi - Shankhiya

Latin - Arsenicum Album

Minerological Identification

Arsenic trioxide is a white or transparent solid in the form of glassy, shapeless lumps or a crystalline powder that resembles sugar. It has no odour or taste. It forms readily when elemental metallic Arsenic is heated to high temperatures or burned.

Properties

Chemical composition	AS_2O_3
Colour	White, tin white, tarnishes quickly to grey
Luster	Submetallic on fresh surfaces
Crystal habit	Hexagonal, scalenoheadral
Cleavage	One direction, distinct
Specific Gravity	5.6 - 5.8
Diaphaneity	Opaque
Hardness (Moh's Scale)	3-4
Fracture	Uneven
Streak	White

Sources and Occurrence

It is scarcely available along with the ores of Iron, Copper, and sulphur. In the mineral form it is found in China, Europe and other countries. In India Hazaaribagh (Bihar), Chitral (Kashmir) and nearby areas obtained with ores of Makshika. The artificial forms are from chimneys of industries and the places where Arsenopyrites are burnt.

Types

स्फटिकाभश्च शङ्खाभो हरिद्राभस्त्रयः स्मृताः। (R.R.S.3/124)

गौरीपाषाणकःप्रोक्तो द्विविधःश्वेतपीतकः। श्वेतःशङ्खसदृक्पीतो दाडिमाभः प्रकीर्तितः।। (A.P.2/336-37)

मल्लस्तु द्विविधः प्रोक्तः श्वेतोऽन्यो रक्तकस्तथा।। (R.T.11/132)

According to Rasa ratna samucchaya, Gauripashana is of 3 types:

1. Sphatikabha- shweta varna- uttama
2. Sankhabha- pandu varna- madhyama
3. Haridrabha- peetavarna- adhama

According to Ayurveda prakasha, it is of 2 types:

1. Shweta - shanka sadrusha - Artificial
2. Peeta - dadimabha - Natural

Rasa tarangini and Yoga ratnakara clạssifies Malla into 2 types:

1. Shweta - Artificial 2. Raktha- Natural

Practically, the market available samples are of 4 colours:

1. Shweta 2. Rakta 3. Peeta 4. Krishna

White is widely used for pharmaceutical preparations

Shodhana

I Method

कारवल्लीफले क्षिपेत्। स्वेदयेद्भण्डिकामध्ये शुद्धो भवति मूषकः।। (R.R.S.3/125)

Malla is placed inside the Karavella (bitter gourd) fruit by removing its pulp inside and subjected to swedana in the karavella rasa will make the malla shuddha.

II Method

विपाचितं शङ्खविषं यत्नतष्टङ्कणाम्भसा। गव्यदुग्धेन वा यामं शुद्धिमायात्यनुत्तमाम्।। (R.T.11/137)

Shankha visha can also be purified by heating it in dola yantra using Tankana jala or Godugdha for 1 yama (3 hours)

S.No.	Drugs used	Method of Shodhana	Reference
1	Karavellaka swarasa	Swedana in Dola yantra	R.R.S.3/125, R.T., R.J.N
2	Tankana jala/Godugdha	Swedana in Dola yantra for 3 hrs	R.T. 11/137
3	Meghanada swarasa/Aja dugdha/Ajarasa	Swedana in Dolayantra for 1 day	R.T. 11/133-135
4	Kanji/Tankanajala/ Ajamamsarasa/Godugdha	Swedana in Dola yantra for 6 hrs	Y.R

Marana

पलद्वयं सुराक्षारमम्बरीषे न्यसेद्विषक्। स्तूपाकारतया तत्र चूर्णितं हस्तिदन्तकम्।।
निदध्यादथ चुल्ल्याञ्च वह्निमारोप्य दीपयेत्। यदैकीभूय निर्धूमं भवेद्धस्मनिभं तथा।।
तदावतार्य तद्भस्म कूप्यां सम्पेष्य स्थापयेत्। भस्मादस्मात्तु कर्षैकं मूषायां सन्निधाय च।। (R.T.11/171-76)

Wide mouthed vessel is taken and 2 Palas of Sura kshara kept in it. Above that, 2 Palas of Hastidanta churna is placed in such a way that it should look like a heap (i.e. wide at base and sharp at the tip) and vessel is heated on oven. When both the drugs get mixed up and there is no smoke, fire is extinguished. The mixture is taken out, mixed well and preserved. Later 2 tolas of this mixture is taken in a Moosha and 1 tola Shuddha Malla Khanda placed over it. Again it is covered by 2 tolas of above mixture. Mukhabandhana is done by using a lid and heat is given in a Lavaka Puta. By this white Malla Bhasma is prepared.

Probable Physico-chemical changes during above processing:

The probable mechanism happening during swedana method of shodhana is described in previous chapter. Studies have revealed that after Gouripashana shodhana, particle size will decrease, which was confirmed by XRD studies and DLS data. FTIR spectrum revealed the presence of organic peaks in processed sample. In SEM-EDAX, weight percentage of Arsenic is reduced and weight percentage of Oxygen is increased after Shodhana, oxygen content is increased which is indicative of increased organic nature of Gouripashana after shodhana. In processed Arsenic, amorphous materials are also seen which may be due to organic content imparted from the medium. Reduction in Arsenic level and increase in organic nature indicates possibility of reduction in toxicity.

CHAPTER NINE

Properties and Therapeutic Uses

Rasa	Tikta
Guna	Snigdha, Laghu, Teekshna
Doshaghnata	Tridoshahara
Karma	Kamoddepaka, Jwarahara, Kushtaghna, Balya, Vrushya, Rasayana, Rasabandakara, Rasaveeryakara. Externally Ksharakarma
Prayoga	Shotha, Gulma, Pandu, Udararoga, Shwasa, Kasa, Kushta, Shleepadoththa jwara, Sandivata, Phiranga, Agnimandya, Vishama jwara, Yakshma, Hrut shola, Pleehavruddhi, Jwaroththa hrddourbalya, Vruschika damshtra

Amayika Prayoga

1. With vasa satwa & Kantakaari choorna in Swasa.

2. With Guduchi & Aryamoola choorna in Slipada jwara.
3. With Shunti & Punarnava choorna in Vatarakta.
4. With Loha bhasma & Rasa sindoora in Rajayakshma.

Management of Ashuddha, Apakwa and Avidhee Sevanajanya Dosha of Gauri-pashana

The untoward effect caused by improperly processed Gauripashana can be pacified by administering Godugdha along with Goghrita and sugar or Tankana jala or Karavella swarasa or Navaneeta along with Tila churna and sugar till the symptoms get pacified.

Dose

खनेत्रेन्दुमिताद् भागाद् रत्तेरारभ्य यत्नतः। खवह्निभागप्रमितं शङ्खभूषं नियोजयेत्।। (R.T.11/145)

The dose of Malla is $\frac{1}{120}^{th}$ - $\frac{1}{30}^{th}$ of Ratti (1-4 mg)

Matra Nirmana Vidhi

गुञ्जोन्मितं शङ्खविषं तिथिमाषकसंमिते। मरीचचूर्णे निक्षिप्य शृङ्गवेराम्भसा ततः।।
खल्वमध्ये निधायाथ मर्दयेत्तु दिनत्रयम्। निर्मापयेत्ततो युक्त्या वटिकां रक्तिकोन्मिताः।।
एकैकां वटिकाञ्चाथ सायम्प्रातस्ततो भिषक्। वीतशङ्कः प्रयुञ्जीत तत्तद्दोषापनुत्तये।।
अनेनैव तु मानेन प्रयोगोद्दिष्टभेषजैः। एतत्सम्मेल्य निमार्य वटिकादीन् प्रयोजयेत्।। (R.T.11/147-49)

Shuddha Malla	-	1 Gunja
Maricha Churna	-	15 Masha
Shrungavera Swarasa	-	Quantity Sufficient

Take Shuddha Malla and Maricha Churna in a Khalwa yantra and triturate with Aardraka Swarasa for 3 days. Prepare 1 Ratti pramana Vatis. One vati in the morning and one in night is given for dosha shamana. In the same quantity, it is added to other formulations and used.

Satwapatana

तालवद् ग्राहयेत्सत्त्वं शुद्धं शुभ्रं प्रयोजयेत्। (R.R.S.3/12)

Satwapatana of Malla is done similar to that of Haratala.

Pathya-apathya

Pathya : Milk, Sugar, Butter, grams and other nutritious substances should be taken in large quantities.

Apathya : Salt, chillies, oil, Onion and other hot and spicy things should be avoided.

Important Formulations

1. Malla Sindhura
2. Suchikabharana Rasa
3. Shankhavishodaya Rasa
4. Kalanala Rasa.
5. Chandeshwara Rasa
6. Sameerapannaga Rasa
7. Malla Vati
8. Malla Chandrodaya rasa
9. Malla Garbha Pottali
10. Panchasuta rasa

Research Updates

1. Anuroopa H K et al, **Evaluation of *Shodhana* effect on *Gouripashana* (Arsenic Trioxide) by Toxicity study in Albino Rats,** IJRAR November 2022, Volume 9, Issue 4

   In sub acute toxicity study, all the values of the evaluated parameters signifies the Unprocessed Gouripashana showing the toxic effect and processed Gouripashana in all the 3 doses and satellite group showing the milder toxic effect reflecting that the shodhana process minimizes the damage to the tissues and that minimum changes was reversible. By this study, it can be concluded that, after Shodhana process, the toxicity of processed Gouripashana was reduced as compared to unprocessed Gouripashana.

2. Acharya Balkrishna et al, **Herbo-metallic ethnomedicine 'Malla Sindoor' ameliorates lung inflammation in murine model of allergic asthma by modulating cytokines status and oxidative stress,** Journal of Ethnopharmacology, Volume 292, 28 June 2022,

   The results suggest that MS acts as an effective anti-asthmatic and anti-inflammatory agent, by regulating various cellular, biochemical and molecular intermediates.

3. K., Shruthan, **Pharmaceutico Analytical Study and Evaluation of Antihistaminic Activity of Malla Sindoora in Guinea Pigs,** PG dissertation, Rajiv Gandhi University of Health Sciences (India) Pro Quest Dissertations Publishing, 2018.

   Mallasindoora is very effective antihistaminic drug and it will impart therapeutic benefit in allergic conditions like Bronchial Asthma. Anupana augments the action of Mallasindoora.

4. P. Sumathi et l, **Evaluation of Cytotoxic potential of Shodhitha Gouripashana processed by two different methods**

   The study demonstrates that Ashodhita (unprocessed) and Shodhita Gouripashana (Processed by two different methods) is confirmed to exhibit in-vitro cytotoxic effect by growth inhibition of Breast carcinoma (MCF-7), Colorectal carcinoma (HCT-116) and Lung epithelial normal cell line (BEAS-2B) for 24 and 48 hours of exposure.

Trinakanta

Synonyms

Trinakanta	Trinakantamani	Trinagrahi

Mineralogical Identification

Amber is a fossil tree resin. In order to qualify as "amber", it is not sufficient for a tree resin merely to harden by losing its volatiles, the molecules have to polymerize, which can take millions of years (or at least 100,000 years).

The Chemical Name of Amber is succinic acid. It is heterogeneous in composition but consists of several resinous materials more or less soluble in alcohol, ether, and chloroform, associated with an insoluble bituminous substance.

Chemical composition	$C_{10}H_{12}O$ fossilized plant resins
Colour	Yellow, Brown, Colorless, Brownish red
Cleavage	None
Crystal system	Amorphous- No Crystals
Crystal habit	Nodular (Tuberose forms having irregular protuberances over the surface), Pulverulent (Forms a loose, poorly-coherent powdery mass)
Specific gravity	1.05 - 1.15
Transparency	Transparent
Hardness (Moh's Scale)	2-2.5
Luster	Resinous
Fracture	Conchoidal
Streak	White
Thermal decomposition	Above 200 °C (392 °F)
Refractive Index	1.539 - 1.545
Dispersion	Strength : None

Sources and Occurrence

Amber is found in many places around the world, from Alaska to Madagascar, but the largest deposits exploited for jewelry and science are in the Dominican Republic, the Baltic region of Europe, and Myanmar, also known as Burma.

Trinakanta Pishti

Shuddha Trinakanta is powdered and triturated with the Gulabarka or Chandanarka for 2- 3 days to make it a fine powder form. This is known as Trinakanta pishti. This is preserved in suitable air tight container for further therapeutic usage.

Probable Physico-chemical changes during above processing

By process of mardana while preparing pishti, Trinakanta looses molecular cohesiveness and it becomes fragile and soft ultimately improving absorption property

Properties and Therapeutic Uses

Guna	Rooksha, Sheeta, Slakshna
Veerya	Sheeta
Doshaghnata	Pittahara
Karma	Hridya, Indriya prasadana, Grahi, Rakta sthambaka
Prayoga	Raktapitta, Hridroga, Pittavikaras

Dose of Pishti

1-2 Masha (1-2 gms)

Anupana:

Madhu, Navaneeta, Sarkara

Important Formulations (Yogas)

1. Javaharmohar
2. Brahmi Vati

Research Updates

1. Joshi N et al, **Characterization and antimicrobial study of Trinakantamani (*Amber*) *Pishti*.** Ayu. 2020 Oct-Dec;41(4):225-234.

   The results of EDX study showed that *Pishti* samples have the small particle size i.e., 701nm than the raw i.e., 1-2 µm, which may facilitate absorption of drug into the body. All heavy metals in the samples were within the permissible limit. Carbon, hydrogen and oxygen are the chief elements of drug which confirms similarity to the *Amber*. TMP had also undergone anti-microbial study against *S. aureus, Escherichia coli, P. aeruginosa* and *S. typhimurium*. All three samples were found to be ineffective as evident by no inhibition zone around the wells as compared to that of control.

Akika (Agate)

Akika is the drug grouped under the Sikata and uparatna varga. Siddabheshaja manimala has mentioned under paradaadi varga. Rasadarpana and Rasamritam grouped it under uparatna varga. Ratna pradeepa specified it as sphatika varga ratna.

Synonyms

Rudhira	Raktapashana	Raktashma	Raktabham	Shona
Hridaya	Pashanahridaya	Hridayopalam	Puteeka	Paalyashma
Hakeeka	Paandha			

Vernacular Names

Sanskrit - Akika
English - Agate (chalcedony)
Hindi - Akika
Unani - Aqeeq

Mineralogical Identification

Agate is the banded form of the mineral Chalcedony, which is a micro-crystalline variety of Quartz. The typical horizontal bands are diagnostic criteria for Akika. Banding in Akika is due to interrupted deposition of silica in cavities.

Chemical composition	SiO_2
Colour	Multicolored in banded formation. Colors include white, blue, red, green, yellow, orange, brown, pink, purple, gray and black
Cleavage	None
Crystal system	Rhombohedral
Crystal habit	Crypto crystalline silica
Specific gravity	2.58-2.64
Transparency	Translucent
Hardness (Moh's Scale)	6.5-7
Luster	Waxy
Fracture	Conchoidal with very sharp edges
Streak	White
Refractive Index	1.530-1.540

Sources and Occurrence

Generally, Akika occurs in pure form. Akika occurs mainly as fillings in the voids in the Deccan Trap rocks. It occurs all over the earth's crust in igneous as well as metamorphic rocks. Agate is found throughout the world. In the United States, it is produced in several western states; Oregon, Washington, Idaho, and Montana are the chief sources of gemstones. It is also available in Germany, Russia, Egypt and Australia.

The most important occurrence of Akika in India is Rajpipla area and further west between the mouths of river Tapti and Narmada in Gujarat. Other occurrences of economic importance are known at Amaravati, Aurangabad, Buldhana, Chandrapur, Jalna, Nasik and Pune in Maharashtra, beds of Krishna and Godavari rivers in Andhra Pradesh, Rajmahal and Sahebganj in Bihar, Dharand, Mandsaur in Madhya Pradesh and Jaipur, Jamnagar, Kutch and Surat in Gujarat.

Types

According to Rasa Darpana, Akika is of 5 types based on colour-

1. Shweta
2. Peeta
3. Harita
4. Krishna
5. Rakta

According to Ayurveda Sara Sangraha-

1. Shweta
2. Peeta
3. Neela
4. Rakta

Grahya Lakshanas

According to Rasamrita, genuine Akika should have the following qualities:

1. Katina - Hard
2. Rakta - Blood coloured or
3. Yakrutvarnayukta - Liver colored

As per the API, Akika which is White colored and bands of Akika which are typically parallel to each other is considered to be best one.

Ashuddha Akikajanya Dosha

According to Unani system of medicine, Akika is ahitakara to Vrukka (kidney) and Kanta (throat) if taken without proper preparation.

Shodhana

Shodhana of Akika can be done either by Nirvapa method or by Swedana method using different drava dravyas.

S.No.	Drugs used	Method of Shodhana	Reference
1	Gulabjala (rose water)/ Triphala Kwatha	21 Nirvapa	Rasadarpana
2	Gulabjala (rose water)	6 Nirvapa	Ayurveda Sarasangraha
3	Ketaki Arka (Pandanus fasicu-laris)/Neelotpala/ Gulab Arka	Nirvapa till it becomes brittle	Bhasma Vignana
4	Ketaki arka/ Vedamushka arka	Nirvapa 15-20 times /till it becomes brittle	Ratna Vigyana, RatnaPradeepa
5	Gulabjala/Dugdha/ Vedamushka arka	21 Nirvapa	API
6	Amla vargeeya dravya rasa	Swedana for 3 hours	Rasadarpana

Marana

I Method

Shodhita Akika is finely powdered and subjected to bhavana with kumari swarasa or gulabarka. Later chakrikas are prepared, dried and enclosed in sharava samputa. Then subjecting it to 3 gajaputa will make the Akika bhasma.

II Method

The Akika bhasma can also be prepared by triturating Shuddha Akika churna with Kumari swarasa, Ketaki rasa, Jalapippali swarasa and with Rambha swarasa and subjected to 7 Kukkuta Puta.

Akika Pishti

Shuddha Akika is powdered and triturated with the Gulab/Ketaki/Chandana Arka for 21 times or 3 days to make it a fine powder form. In AFI, Kumari swarasa, Ketaki swarasa, Jalapippali swarasa, Kadalikanda rasa are mentioned as dravadravya for the preparation of Akika pishti. This is preserved in suitable air tight container and can be used therapeutically in conditions where Akika bhasma is indicated.

Probable Physico-chemical changes during above processing

Same physico chemical changes can be attributed as explained in previous chapter regarding shodhana by Nirvapa method, marana and also Pishti preparation.

Properties and Therapeutic Uses

Rasa	Kashaya and Madhura
Guna	Sheeta
Veerya	Sheeta
Vipaka	Madhura
Doshaghnata	Pitta shamaka
Karma	Hridya, Vrushya, Rakta Janaka, Netrya, Balya, Kamottejaka, Ashmari Nashaka, Ojo Vardhaka, Mastishkya, Medhya, Smaranashakti Vardhaka, Pramathi, Rakta sthambi, Vruna ropaka, Vruna shoshaka
Prayoga	Andhatva, Raktapitta, Hridroga, Yakrit Vikara, Ashmari, Rakta Pradara, Shveta Pradara, Murccha, Prameha, Teevra Jwara, Daha, Unmada, Kasa, Kshaya, Vrana, Raktarsha, Visha, Anidra, Raktachapa, Netra vikara

Management of Ashuddha Akikajanya Dosha

The ill efects of Akika can be pacified by intake of kateera beeja with Kushmanda beeja/kadudaka beeja.

Dose

2-4 Ratti (250-500 mg).

Anupana

Godugdha, Navaneeta, Madhu, Amalaki Swarasa, Ardraka Swarasa, Kushmanda Swarasa.

Important Formulations (Yogas)

1. Akika Bhasma.
2. Akika Pishti.

Research Updates

1. Vidyashree et al, **Analytical assessment of Akika Pishti based on Ancient and Modern Parameters.** J Ayurveda Integr Med Sci 2017;3:92-100.

   Akika Pishti which is prepared as per classically explained method is safe, having nano particle size revealed by particle size and pH of 6.8 and hence more bio-available. XRD reveals that, there is change in compound from SiO_2 to high quartz after the Pishtikarana and simultaneously the organic properties are embedded to Pishti from Bhavana Dravyas which is well proved by SEM-EDAX.

Sudha (Lime Stone)

Limestone is usually a biological sedimentary rock, forming from the accumulation of shell, coral, algae, fecal, and other organic debris. It can also form by chemical sedimentary processes, such as the precipitation of calcium carbonate from lake or ocean water.

Synonyms

चूर्ण चूर्णकचूर्णन्तु सुधासौधविलेपनम्।
तदैव च समाख्यातं शिलाक्षारं भिषग्वरैः॥ (R.T.11/215)

Churna	Churnaka	Sudha	Soudhavilepana	Shila-kshara

Vernacular Names

Sanskrit	:	Sudha	English	:	Lime
Hindi	:	Chuna	Kannada	:	Sunna

Mineralogical Identification

Limestone is a sedimentary rock composed primarily of calcite, a calcium carbonate mineral with a chemical composition of $CaCO_3$.

Chemical composition	$CaCO_3$
Colour	White

Cleavage	Non-Existent
Crystal system	Isometric - Hexoctahedral
Specific Gravity	2.3-2.7
Transparency	Opaque
Hardness (Moh's Scale)	3 to 4
Luster	Dull to Pearly
Fracture	Splintery
Streak	White

Sources and Occurrence

Limestone can be found all over the world and is the major type of rock found in karst features (crystal cave systems found in bedrock). Of all the sedimentary rocks found on Earth, almost ten percent of them are some form of limestone. It usually forms in clear, calm, warm, shallow marine waters. Because it is widely available, it has been used throughout the centuries for many uses, from building materials to chemical additives. Two of the most famous limestone deposits are the islands of the Florida Keys and Niagara Falls.

In India, Rajasthan is the leading producing state of lime stone accounting for the total production of limestone, followed by Madhya Pradesh & Andhra Pradesh. Other states having limestone deposits includes Chhattisgarh, Karnataka, Gujarat, Tamil Nadu and Telangana.

Properties and Therapeutic Uses

Karma	Kriminashaka, Dugdhapachana, Gandakamla vishanashana
Prayoga	Atisara, Amlapitta, Grahaniroga, Khalika

Preparation of Churnodaka (Lime water): (R. T. 11/216-218)

Two ratti (250 mg) of sudha (lime stone) is powdered and 5 tola (60 ml) of water is added and mixed thoroughly and kept undisturbed for 12 hours. Later the supernatant water is collected, filtered through filter paper and the liquid is preserved in glass bottle as churnodaka.

Dose

Children up to 1year - 30-60 drops. Adult - 2 Tolas (24 ml).

Anupana

Jala, Ksheera.

Important Formulations (Yoga)

Churnodaka.

Khatika

Chalk is an inexpensive and erasable writing material and the most widely known. Chalk, in both its natural and man-made form, is white in colour and is considered to be a fairly soft solid. Chalk is a variety of limestone composed mainly of calcium carbonate derived from the shells of tiny marine animals known as foraminifera and from the calcareous remains of marine algae known as coccoliths.

Synonyms

खटिका खटिनी चैव खटी लेखनमृत्तिका। कठिनी वै कठिनीका वर्णिका वर्णलेखिका।। (R.T.11/208)

Khatika	Khatini	Khati	Lekhana-mruttika	Katini
Katinika	Varnika	Varnalekhika		

Vernacular Names

Sanskrit - Khatika
English - Chalk
Kannada - Sunnada kaddi
Hindi - Khalam

Mineralogical Identification

Chalk is a soft, white, porous, sedimentary carbonate rock, a form of limestone composed of the mineral calcite. Chemical composition of chalk is calcium carbonate and with minor about silt and clay minerals. It is extremely porous, permeable, soft and friable.

Chemical composition	$CaCO_3$
Colour	White or light grey
Cleavage	Non-Existent
Specific Gravity	2.3-2.4
Transparency	Opaque
Hardness (Moh's Scale)	1
Luster	Dull
Fracture	Not available
Streak	White

Sources and Occurrence

Natural chalk occurs in deep sea conditions and consists of gradual accumulation of very small calcite plates. It is formed in the sea by sub-microscopic plankton, which fall to the sea floor and are then consolidated and compressed during diagenesis into rock.

Chalk deposits are found in Cretaceous beds on the Austin Chalk, Selma Group, and Niobrara Formations of the North American interior. Chalk is also found in western Egypt and western Australia. The Champagne region of France is mostly underlain by chalk deposits, which contain artificial caves used for wine storage. Some of the highest chalk cliffs in the world occur at Jasmund National Park in Germany and at Mons Klint in Denmark.

Types

खटिका द्विविधा ख्याता खटि गौरखटि तथा। खटि तु मलिना चान्या श्वेता मृदु शिलोपमा।। (R.T.11/209)

Khatika is of 2 types :

1. Khati
2. Goura khati

Among these two, Khati is malina (muddy & unclean in appearance); Goura khati is a clean, soft & white in colour.

Shodhana

खटिचूर्णम् शुद्धपात्रे निधाया विमले जले। प्रक्षालयेद्विधानज्ञो विशुद्धयति न संशयः।। (R.T.11/210)

The Khatika churna is taken in an earthen vessel and required quantity of clean water is added, dissolved and filtered. The wet powder obtained is collected and dried under sun. Then it is powdered and stored in airtight container as shuddha Khatika.

Marana

Not required & has no classical references.

Probable Physico-chemical changes during above processing

Khatika shodhana will remove the sand, mud and other physical impurities by the method of filteration as these are insoluble in water.

Properties and Therapeutic Uses

खटिका शिशिरा तिक्ता मधुरा शोथनाशिनी। पित्तप्रशमनी कामं विविधव्रणरोपणी।।
कफदाहास्रदोषघ्नी नेत्रामयनिषूदिनी। हरिद्वर्णातिसारघ्नी स्वेदादिस्रावहारीणी।। (R.T.11/211-212)

Rasa	Tikta, Madhura
Guna	Sheeta
Veerya	Sheeta
Doshaghnata	Kaphapittahara
Karma	Vishaghna, Netrya, Shothaghna, Vranaropana
Prayoga	Daha, Raktapitta, Shotha, Atisara, Pravahika, Grahani, Netraroga,

Dose

½ - 1 masha (½to 1 gm).

Cleavage	Poor to perfect
Crystal system	Monoclinic
Crystal habit	Fine-grained, Massive, Platy, Fibrous/asbestiform
Specific gravity	2.2-2.6
Transparency	Translucent to opaque
Hardness (Moh's Scale)	3-6
Luster	Greasy, waxy or silky
Fracture	Flexible, Uneven
Streak	White

Sources and Occurrence

Serpentine is a major rock forming mineral and is found as a constituent in many metamorphic and weather igneous rocks. It is available in China, Tibbet, Laddak, Gadhawal and Nepal mountains.

Shodhana and Marana

Shodhana and Marana process are not mentioned.

Pishti

Nagapashana is to be triturated with rose water, for 3-4 days to make it fine powder form.

Probable Physico-chemical changes during above processing

Physico-chemical changes are same as mentioned for Trinakantapishti in previous chapter

Properties and Therapeutic Uses

Guna	Snigdha, Laghu, Rooksha, Ushna
Veerya	Ushna
Karma	Medhya, Hrudhya, Mastishkya, Yakrithbalakar, Ojovardhaka, Vishaghna and Vamanahara.
Prayoga	Hrudhayadhourbalya, Atisara, Yakruthvyadhis, Cholera

Dose

2-8 ratti (250 mg - 1 gm).

Anupana

Rose water, Milk.

Important Formulations

1. Jaharmohar pishti 2. Godanti mishrana 3. Muktadi vati 4. Bala vati

Dugdhapashana (Talc)

Talc is a mineral composed of hydrated magnesium silicate, commonly known as Talcum Powder. Talc is known for being the softest mineral on earth. In loose form, it is the widely used substance known as talcum powder.

Synonyms

दुग्धपाषाणको दुग्धी दुग्धपाषाणिका तथा। दुग्धा दुग्धशिला चैव क्षीरी क्षीरक्षवश्च सः॥
वज्राभो दीप्तिकश्चापि सोंधो गोमेदसन्निभः। दुग्धोपलो दुग्धदृद् भिषग्भिः परिकीर्तितः॥ (R.T.11/230-231)

Dugdhapashana	Dugdhi	Dugdhapashanika	Dugdha	Dugdha Shila
Ksheeri	Ksheerakshava	Vajrabha	Deeptika	Soudha
Gomedasannibha	Dugdhopala	Dugdhadrushadh		

Vernacular Names

Sanskrit : Dugdhapashana
English : Talc, Soft stone
Hindi : Sangejarahat
Kannada : Komala Khanija

Mineralogical Identification

Talc is a clay mineral composed of hydrated magnesium silicate. Each talc deposit has a unique morphology and mineralogy, but all talcs exhibit the following unique properties: softness, water repellent, chemical inertness, and an affinity for organic substances.

Chemical composition	$H_2Mg_3 (SiO_3)_4 / Mg_3 Si_4 O_{10}(OH)_2$
Colour	Light to dark green, brown, white, grey, colorless
Cleavage	Perfect basal
Crystal system	Monoclinic or triclinic
Crystal habit	Foliated to fibrous masses, rare as platey to pyramidal crystals
Specific gravity	2.58 to 2.83
Transparency	Translucent to opaque
Hardness (Moh's Scale)	1
Luster	Wax-like or pearly
Fracture	Fibrous, Micaceous
Streak	White
Refractive Index	1.538-1.6

Cleavage	Poor to perfect
Crystal system	Monoclinic
Crystal habit	Fine-grained, Massive, Platy, Fibrous/asbestiform
Specific gravity	2.2-2.6
Transparency	Translucent to opaque
Hardness (Moh's Scale)	3-6
Luster	Greasy, waxy or silky
Fracture	Flexible, Uneven
Streak	White

Sources and Occurrence

Serpentine is a major rock forming mineral and is found as a constituent in many metamorphic and weather igneous rocks. It is available in China, Tibbet, Laddak, Gadhawal and Nepal mountains.

Shodhana and Marana

Shodhana and Marana process are not mentioned.

Pishti

Nagapashana is to be triturated with rose water, for 3-4 days to make it fine powder form.

Probable Physico-chemical changes during above processing

Physico-chemical changes are same as mentioned for Trinakantapishti in previous chapter

Properties and Therapeutic Uses

Guna	Snigdha, Laghu, Rooksha, Ushna
Veerya	Ushna
Karma	Medhya, Hrudhya, Mastishkya, Yakrithbalakar, Ojovardhaka, Vishaghna and Vamanahara.
Prayoga	Hrudhayadhourbalya, Atisara, Yakruthvyadhis, Cholera

Dose

2-8 ratti (250 mg - 1 gm).

Anupana

Rose water, Milk.

Important Formulations

1. Jaharmohar pishti 2. Godanti mishrana 3. Muktadi vati 4. Bala vati

Dugdhapashana (Talc)

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दुग्धपाषाणको दुग्धी दुग्धपाषाणिका तथा। दुग्धा दुग्धशिला चैव क्षीरी क्षीरक्षवश्च सः॥
वज्राभो दीप्तिकश्चापि सौंधो गोमेदसन्निभः। दुग्धोपलो दुग्धदृषद् भिषग्भिः परिकीर्तितः॥ (R.T.11/230-231)

Dugdhapashana	Dugdhi	Dugdhapashanika	Dugdha	Dugdha Shila
Ksheeri	Ksheerakshava	Vajrabha	Deeptika	Soudha
Gomedasannibha	Dugdhopala	Dugdhadrushadh		

Vernacular Names

Sanskrit : Dugdhapashana
English : Talc, Soft stone
Hindi : Sangejarahat
Kannada : Komala Khanija

Mineralogical Identification

Talc is a clay mineral composed of hydrated magnesium silicate. Each talc deposit has a unique morphology and mineralogy, but all talcs exhibit the following unique properties: softness, water repellent, chemical inertness, and an affinity for organic substances.

Chemical composition	$H_2Mg_3 (SiO_3)_4 / Mg_3 Si_4 O_{10}(OH)_2$
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Cleavage	Perfect basal
Crystal system	Monoclinic or triclinic
Crystal habit	Foliated to fibrous masses, rare as platey to pyramidal crystals
Specific gravity	2.58 to 2.83
Transparency	Translucent to opaque
Hardness (Moh's Scale)	1
Luster	Wax-like or pearly
Fracture	Fibrous, Micaceous
Streak	White
Refractive Index	1.538-1.6

Sources and Occurrence

Talc is widespread and is found in most areas of the world where low-grade metamorphism occurs. Some localities for good crystals or pure material include Austria, Switzerland, Italy, France, Germany, Norway, Siberia, Russia, USA. In India, Substantial quantities of resources are established in Rajasthan, Uttarakhand, Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Jharkhand, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Odisha, Sikkim and Tamil Nadu.

Shodhana

Not mentioned.

Marana

It is triturated with rose water to obtain its bhasma.

Properties and Therapeutic Uses

Rasa	Madhura
Guna	Snigdha, Sheeta
Veerya	Sheeta
Doshaghnata	Pittahara
Karma	Jwarapaha, Ruchya, Grahi, Kasa Swasahara, Vranaropaka, Shonithasthapana, Vranaropaka
Prayoga	Jwara, Twakdaha, Udara, Aadmana, Pittaja Shula, Hridroga, Kasa, Shwasa, Twakrogas, Mukha and Dantarogas

Dose

1-2 Ratti (125-250 mg).

Anupana

Dadhi, Madhu, Dugdha.

Discussion

Parada is considered as the principle drug in Rasashastra. Along with Parada, various other metals and minerals are also described in this science. Among these Rasa dravyas, some are found to be more useful and some are of less use in the processing of Parada due to many reasons. The reasons might be due to their inherent qualities of physical properties like hardness, etc., stability, heat tolerence capacity and chemical composition, the quantity and property of satva present in them. These properties also make them comparatively less effective even in therapeutic application. Therefore such drugs are categorised under 'Desirable to know'. These drugs are also need to be studied for their better applications.

Conclusion

Rasadravyas, though found to be less potent comparatively, they are commonly used in treating different diseases and used in many formulations because of easy processing, which does not involve tedious and laborious procedures. So it is better to have the knowledge of these drugs to understand its processing methods and therapeutic uses.

Extended Learning

- Research updates of Rasadravyas

MODEL QUESTIONS

Short Answers

- Describe the Maraana, therapeutic dose and uses of Kasisa (Green Vitriol)
- Explain Shodhana, Matra, Anupana and Upayoga of Gauripashana.
- Write the sources and occurrence of Trinakanta and method of preparation of its pishti.
- Describe the Akika Shodhana and marana vidhi.
- Briefly describe the properties, dose, anupan and therapeutic uses of Sudha.
- Pathya-apathya and ashuddha, apakwa and avidhee sevanjanya dosha and its management, important formulations of Kaseesa (Green Vitriol).
- What is Satvapatana? Describe the Satvapatana method and uses of Satva obtained from Sasyaka (Peacock ore).

CHAPTER 10

RASA DRAVYA PARICHAYA – III

PAPER 1

Contents

Synonyms, Minerological Identification, sources, types, Grahya, Agrahyata, Shodhana, Marana, Properties, dose, Ashuddha/Apakwa Bhasma Sevanajanya Vyadhi and their shantyupaya, yoga, Research updates of

Vaikrantha, Vimala (Iron Pyrite), Chapala, Rasaka, Anjana, Kankustha, Agnijara, Giri Sindura (Red oxide of Hg), Mriddarashringa (Litharge), Kamsya (Bronze), Pittala (Brass), Vartaloha, Manikya (Ruby), Tarkshya (Emerald), Pushparaga (Topaz), Nilam (Sapphire), Gomeda (Zircon or Cinnamone stone), Vaidurya (Cats eye), Mrigashringa (Stag horn), Sikata (Silica), Vyomashma (Sangeyashab - Jade), Kousheyashma (Asbestos), Badarshama (silicate of lime)

Learning Outcome

At the end of this chapter, Students can able to

1. Enlist Synonyms and sources of Rasadravyas
2. Determine types, Grahya-Agrahya, properties & classical as well as Mineralogical Identification of Rasadravyas
3. Explain Shodhana, Marana and Probable Chemical Changes
4. Enlist Rasadravyas from this group and describe important kalpas with their therapeutic utility

Vaikrantha

Introduction

Vaikranta is the mineral drug included in the group of Maharasa and Uparatna. It is suggested to use Vaikranta instead of Vajra in some instances. It has got the property of cutting or produces deformity of other metals, so named as Vaikranta.

विकृन्तयति लोहानि तेन वैक्रान्तकः स्मृतः।। (R.R.S.2/60)

Synonyms

वैक्रान्तश्चैव विक्रान्तं वैक्रान्तं जीर्णवज्रकम्। कुवज्रं क्षुद्रकुलिशं चूर्णवज्रञ्च तन्मतम्।। (R.T.23/155)

Vikranta	Vaikranta	Jeernavajraka
Kuvajra	Kshudrakulisha	Churnavajra

Nirukti of Vaikranta

वज्रवत् सर्वरोगाणां हरणाय यतस्त्विदम्। धत्ते विक्रान्तिमतुलां वैक्रान्तं कथ्यते ततः।। (R.T.23/156)

As it eradicates all diseases just like Vajra, it is called as Vaikranta.

विक्रामयति लोहानि।

It cuts or spoils the lohas.

वैकृन्तीतीरसम्भूतो रसो वैक्रान्तको स्मृतः।

It is found near the vaikrunti river bed.

Minerological Identification

Tourmaline is the name of a large group of boron silicate minerals. These minerals share a common crystal structure and similar physical properties - but vary tremendously in chemical composition. The wide range of compositions and color zoning within crystals causes tourmaline to occur in more colors and color combinations than any other mineral group.

Chemical Name	Tourmaline
Chemical composition	$Na(MgFeMnLiAl)_3\ Al_6\ (B_3O)_3\ (Si_6O_8)$
Varieties	1. Rubellit- Transparent, red and pink. 2. Indicolite- Indigo blue. 3. Brazilian sapphire- Tr. Berila blue. 4. Brazilian emerald- Tr. Green 5. Achroite- Colorless.
Colour	Commonly black or bluish black. more rarely blue, pink, green and colourless.
Luster	Vitreous
Crystal	Prismatic crystal Commonly
Structure	Three-sided, six-sided, or nine-sided, and striated vertically.
Cleavage	Prismatic, Rhombohedral, Trigonal.
Specific gravity	2.9 - 3.2
Hardness	7 - 7.5
Fracture	Subconchoidal to uneven
Streak	White

Types

श्वेतः पीतस्तथा रक्तो नीलः पारावतप्रभः। मयूरेकण्ठसदृशश्चान्यो मरकतप्रभः।।
देहसिद्धिकरं कृष्णं पीते पीतं सिते सितम्। सर्वार्थसिद्धिदं रक्तं तथा मरकतप्रभम्।
शेषे द्वे निष्फले वर्ज्ये वैक्रान्तमिति सप्तधा।। (R.R.S.2/61-63)

Based on the Colour, Vaikranta is of 7 types :

1. Shweta (White)
2. Peeta (Yellow)
3. Rakta (Red)
4. Neela (Blue)

CHAPTER TEN

5. Paravata prabha (Grey like Pigeon)
6. Mayurakanta sadrusha (Peacock neck colour)
7. Marakata prabha (Emarald colour)

Black variety of Vaikranta is used in Dehasiddhi; Yellow variety is used for Peeta karma (converting lower metals into Gold); White variety is used for Shweta karma (converting lower metals into Silver); Rakta and Marakata varieties are used for attaining all Siddhis; other 2 varieties (Neela and Paravata prabha) are to be discarded as they are of no use.

श्वेतो नीलस्तथा रक्तः पीतः पारावतप्रभः। तार्क्ष्याभः कर्बुरः कृष्णो वर्णतश्चाष्टधा हि सः।। (R.T.23/158)

According to Rasa Tarangini, Vaikranta is of 8 types:–

1. Shweta (White)
2. Neela (Blue)
3. Rakta (Red)
4. Peeta (Yellow)
5. Paravata prabha (Grey like Pigeon)
6. Tarkshyaabha (Emarald colour)
7. Karboora (Blackish ash)
8. Krishna (Black)

Grahya Lakshana

अष्टास्रश्चाष्टफलवः षट्कोणो मसृणो गुरुः। शुद्धमिश्रितवर्णश्च युक्तो वैक्रान्त उच्यते।। (R.R.S.2/52)

अष्टास्रनमष्टफलकं सितपीतासितारुणम्। मसृणं गुरु षट्कोणं वैक्रान्तं जात्यमुच्यते।। (R.T.23/157)

Vaikranta possessing the following qualities is said to be the acceptable one:

1. Ashta asra (Eight edges).
2. Ashta phalaka (Eight surfaces).
3. Shat kona (Six angles).
4. Masruna (Soft and smooth to touch).
5. Guru (Heavy).
6. Shuddha (Clear).
7. Mishrita varna (Multicoloured).
8. Which is White, yellow, black and red colour.

Ashudda Vaikranta Sevanajanya Dosha

अशुद्धौ वज्रवैक्रान्तौ किलासं दाहसंततिम्। पार्श्वपीडां तथा पाण्डुं कुरुतस्तौ विशोधयेत्।। (A.P.5/168)

The intake of Ashuddha Vaikranta leads to:

1. Kilasa (Skin disease).
2. Daha (Burning sensation).
3. Pandu (Anaemia) and,
4. Parshva peeda (Pain in the flanks).

So vaikranta has to be undergo shodhana before administration.

Shodhana

कुलत्थक्वाथसंस्विन्नो वैक्रान्तः परिशुध्यति। (R.R.S.2/66)

वैक्रान्तः सपटुक्षारः कुलत्थक्काथयोगतः। दोलायन्त्रे परिस्विन्नः शुद्धिमाप्नोति यामतः।। (R.T.23/161)

Vaikranta will get purified if it is heated/steamed in Dolayantra with the Dravas like Kulattha kwatha or Lavanayukta ksharajala for 3 hours.

S.No.	Drugs used	Method of Shodhana	Reference
1	Kulattha Kwatha	Swedana for 3 hours	R.R.S.2/66 R.T. 23/161
2	Lavanayukta Ksharajala	Swedana for 3 hours	R.T.23/161
3	Kadalikanda Drava	Swedana for 3 hours	R.T. 23/162
4	Haya Mutra	Nirvapa for 21 times	R.Ci. 7/63

Marana

I Method

म्रियतेऽष्टपुटैर्गन्धनिम्बुकद्रवसंयुतः। (R.R.S. 2/67)

Shuddha Vaikranta is mixed with equal quantity of Gandaka and blended to make uniform mixture. Later, Nimbu rasa is added to the mixture and triturated well till the liquid portion dries up. Chakrikas are prepared out of this and dried. Dried chakrikas are enclosed in sharava samputa and subjected to Gajaputa. The same procedure is repeated for 8 times to obtain Vaikranta bhasma.

II Method

विमलबलिविमिश्रं चूर्णवज्रस्य चूर्णं। समदरदसमेतं निम्बुनीरेण पिष्टम्।।

द्विरदपुटसमाख्ये तत् पुटे सम्पुटस्थं। वसुमितपुटपक्वं पञ्चतां याति नूनम्।। (R.T. 23/163)

Shodita Vaikranta is mixed with equal quantity of Shuddha Hingula and Shuddha Gandaka and blended in khalva yantra to get homogenous mixture. Then, the mixture is added with Nimbu rasa and triturated till the liquid portion evaporates. Later, it is dried in sun and dried powder is confined inside the sharava samputa and subjected for Gajaputa. This process is repeated for 8 times to obtain the bhasma of Vaikranta.

S.No	Drugs used	No. and Type of Puta	Reference
1	Shuddha Gandhaka; Nimbu rasa bhavana	8 Gajaputa	R.R.S.2/67
2	Nirvapa with Haya mutra; Hayamutra bhavana	Gajaputa	R.R.S.2/67-68
3	Shuddha Hingula + Shuddha Gandaka; Nimbu rasa bhavana	8 Gajaputa	R.T. 23/163
4	3 parts of Gandaka + 1 part of Parada; Nimbu rasa bhavana	8 Gajaputa	R.T. 23/164-166

Properties and Therapeutic Uses

वैक्रान्तस्तु त्रिदोषघ्नः षड्रसो देहदार्ढ्य कृत्। पाण्डूदरज्वरश्वासकासयक्षयप्रमेहनुत्।। (A.P.5/167)

Rasa	Shadrasa
Guna	Snigdha, Guru
Veerya	Sheeta
Vipaka	Madhura
Doshaghnata	Tridoshaghna
Karma	Vajra tulya karma, Rasayana, Dehadardyakara, Ativrshya, Yogavahi, Balavarnakara, Prajnaprada, Agni Deepana, Twachya, Vishaghna.
Prayoga	Jwara, Kushta, Kshaya, Pandu, Udara, Shwasa, Kasa, Yakshma, Prameha, Shvayathu

Dose

तत्त्वांशतो रक्तिकाया रुद्रांशप्रमितं मृतम्। वैक्रान्तकं प्रयुञ्जीत बलकालाद्यपेक्षया।। (R.T.23/170)

The general dose of Vaikranta bhasma is ¼ Ratti - 1/11 Ratti (5-11 mg). Its dose has to be fixed with due consideration of bala, kala and other factors of rogi and roga.

Vaikranta Satwapatana

सत्त्वपातनयोगेन मर्दितश्च वटीकृतः। मूषास्थो घटिकाध्मातो वैक्रान्तः सत्त्वमुत्सृजेत्।। (A.P. 5/171)

Shuddha Vaikranta is mixed with the required amount of drugs used for the satwapatana and triturated to prepare round mass of desired size. These are dried well and taken in the Musha. Musha, after proper sealing, subjected for intense heating in koshti for one hour by which the satwa get extracted out of Vaikranta.

Important Formulations

1. Suchikabharana Rasa
2. Ratna prabha Vati
3. Vasanta Kusumakara Rasa
4. Apoorvamalini Vasanta Rasa
5. Trilokya chintamani Rasa
6. Kanchanabhra Rasa

Research Updates

Tripathi R et al, **Physico-chemical study of Vaikranta bhasma.** AncSci Life. 2013 Apr;32(4):199-204.

In this study, Data suggests that *vaikranta bhasma* is a multi-mineral compound, which contains iron and silica as major constituents and others are present as trace elements. The data obtained in this study suggest that quality specifications for *vaikranta bhasma* can be developed using tests described in Ayurvedic science along with analytical tools available today.

Vimala (Iron Pyrite)

Vimala is categorised under the Maharasa as well as among Upadhatu varga. It belongs to Pyrite group of minerals. Chemically, it is not much different from Rajata makshika. Rajata makshika contains copper, iron and sulphur, whereas, Vimala contains only iron and sulphur. But in Rasatarangini, it is mentioned that Rajata makshika and Vimala are the same substance.

Synonyms

There are no references of synonyms of Vimala found in the classical texts.

Vernacular Names

Sanskrit - Vimala
English - Iron pyrite
Hindi - Vimal
Kannada - Vimala

Minerological Identification

Vimala is in a form of Pale yellow cubic pieces, unctuous looking, with multiple surfaces and angles. Its yellow colour resembles to that of brass. It contains Iron (46.6%) and Sulphur (53.4%). Hence it is known as Iron Pyrite. It also contains some other elements in traces.

This mineral have earned the nickname fool's gold due to its resemblance to gold. Despite being nick named fool's gold, small quantities of gold are sometimes found associated with Pyrite (contains up to 0.37% gold).

Properties

Chemical composition	FeS_2
Colour	Pale brass yellow, dull gold
Luster	Metallic, glistening
Crystal habit	Cubic, faces may be striated, frequently Octahedral
Cleavage	Indistinct
Specific Gravity	5
Diaphaneity	Opaque
Hardness (Moh's Scale)	6-6.5
Fracture	Very uneven, sometimes conchoidal
Streak	Greenish-black to brownish-black

Source and Occurrence

Pyrite occurs in hydrothermal veins as an accessory mineral in igneous rocks, magmatic segregations and as very large bodies. It is distributed in areas like Italy, Spain, US, UK, Japan and Canada. In India, it is found in Bihar, Kashmir, Assam, Orissa, Madhya Pradesh, West Bengal, Tamil Nadu, Andhra Pradesh and Karnataka. According to Ayurveda texts, sources of Vimala is found associated with that of Silver and Lime.

Types

विममिश्रिषः प्रोक्तो हेमाद्यस्तारपूर्वकः।
तृतीयः कांस्यविमलस्तत्तत्कान्त्या स लक्ष्यते।। (R.R.S.2/95)

According to Rasa Ratna Samucchaya, Vimala is of 3 types:

1. Hema Vimala - Useful in Peeta/Swarna karma (conversion of lower metals into gold)
   - Shreshtatama
2. Tara Vimala - Useful in Roupya karma (conversion of lower metals into Silver)
   - Shreshtatara
3. Kamsya Vimala - Useful for the preparation of medicines
   - Shreshta

According to Rasarnava, Vimala is of 3 types:

1. Shukla 2. Peeta 3. Lohita

Grahya Lakshana

वर्तुलः कोणसंयुक्तः स्निग्धश्च फलकान्वितः। (R. R. S 2/96)

Vimala having the following qualities is said to be acceptable one:

1. Vartula circular.
2. Kona samyukta possess angles.
3. Snigdha smooth and soft to touch.
4. Phalakanvita having surfaces.

Shodhana

आटरुषजले स्विन्नो विमलो विमलो भवेत्।
जम्बीरस्वरसे स्विन्नो मेषशृङ्गीरसेऽथवा।।
आयति शुद्धिं विमलो धातवश्च यथाऽपरे। (R.R.S.2/98-99)

Vimala will get purify if it is tied in potali and subjected to swedana in Dolayantra using Vasa swarasa or kwatha. Also shodhana of Vimala can be done by swedana in Dolayantra with Jambira Rasa or Meshashringi Rasa.

S.No.	Drugs used	Method of Shodhana	Reference
1	Vasa Swarasa or Kwatha	Swedana in Dolayantra	R.R.S.2/98
2	Jambira Rasa	Swedana in Dolayantra	R.R.S.2/98
3	Meshashringi Rasa	Swedana in Dolayantra	R.R.S.2/98

Marana

गन्धाश्मलकुचाम्लैश्च म्रियते दशभिः पुटैः।। (R.R.S.2/100)

1 part of Shuddha Vimala is blended with the same quantity of Shuddha Gandhaka and triturated with Lakucha Rasa. Chakrikas are prepared, dried, confined in sharava samputa and subjected to puta (Gaja puta). The entire process is repeated for 10 times to obtain Vimala bhasma.

S.No	Drugs used	No. and Type of Puta	Reference
1	Gandhaka; Lakucha rasa for bhavana	10 putas (Gaja puta).	R.R.S.2/100

Properties and Therapeutic Uses

मरुत्पित्तहरो वृष्यो विमलोऽतिरसायनः।। (R.R.S.2/96)

विमलाया गुणाःकिञ्चिन्न्यूनाः कनकमाक्षिकात्।। (A.P.4/24)

Rasa	Katu, Tikta
Guna	Snigdha, Guru
Veerya	Ushna
Vipaka	Katu
Doshaghnata	Vatapittahara
Karma	Vrshya, Rasayana, Similar to Swarna Makshika with bit less potency
Prayoga	Pandu, Prameha, Shoola, Aruchi, Grahani, Jwara, Yakshma, Kamala, Twak dosha, Vrana, Shotha, Arshas, Bhagandara

Dose

½ - 2 Ratti (62-250 mg)

Anupana

Vimala is administered along with the Vidanga, Trikatu, Triphala or Madhu as anupana.

Vimala Satwapatana

सटङ्कलकुचद्रावैर्मेषशृङ्ग्याश्च भस्मना। पिष्टो मूषोदरे लिप्तः संशोष्य च निरुध्य च।।
षटप्रस्थकोकिलैर्ध्मातो विमलः सीससन्निभः। सत्त्वं मुञ्चति तद्युक्तो रसः स्यात्स रसायनः।। (R.R.S.2/94-95)

Equal quantity of Shuddha Vimala, Shuddha Tankana and Meshashrnga bhasma

is taken in khalwa yantra, mixed thoroughly and triturated with Lakucha Rasa. The paste of this mixture is smeared on the inner surface of the musha, dried and sealed. This musha is subjected to heat with 6 prashtha (Approximately 4380 gms) of coal and blowed to intensify the heat. By this, satwa resembling the lead get extracted out of Vimala which is a good Rasayana.

Management of Ashuddha, Apakwa and Avidhee Sevanajanya Dosha of Vimala

विकारो यदि जायेत् विमलाया निषेवणात्। शर्करा सहिता भक्षेत् मेषशृङ्गी दिनत्रयम्।। (B.R.R.S.)

For the treatment of untoward effect caused by impure or improperly processed Vimala, one has to be administer Meshasringi churna with sugar for three days or till the symptoms get pacifies.

Important Formulations

1. Rasendra chudamani Rasa
2. Kshayakesari Rasa
3. Navaratna rajamrganka Rasa

Research Updates

Dr. Shweta S. Nayaket al, **A Comparative Pharmaceutico-analytical study of Vimala bhasma prepared by classical puta method and electrical horizontal muffle furnace,** WJPPS, Volume 9, Issue 10, 1819-1833

In the present entitled study, Vimala Bhasma (EHMF) is found to be Pharmaceutically very convenient to prepare and Shows good Analytical results compare to Vimala Bhasma (Classical). Yield of Vimala Bhasma (Classical) is 63.6% and Vimala Bhasma (EHMF) is 70%.

Chapala

CHAPTER TEN

Chapala is one among the maharasa and it is a rare mineral. Probably, because of this reason many texts of Rasa shastra not mentioned Chapala in any group. Artificial preparation of Chapala like Naga sambuta Chapala and Vanga sambuta Chapala in Rasa texts confirms its rare nature.

Definition

वङ्गवद्रवते वह्नौ चापलस्तेन कीर्तितः। (R.R.S.2/143)

As the drug melts like Vanga (Tin), it is known as Chapala.

Synonyms

Synonyms are not mentioned in any Rasagranthas. In Rasarnava it is mentioned as Shaila.

Minerological Identification

Selenium is found in the form of both crystalline and amorphous polymorphic

structures in nature. It is rarely found as pure ore or in pure elemental form. It is generally found in metal sulphide ores.

Chemical composition	Se
Colour	Gray to grayish black, reddish gray, red
Luster	Metallic
Crystal habit	Trigonal
Cleavage	Distinct/Good
Specific Gravity	4.8
Diaphaneity	Opaque
Hardness (Moh's Scale)	2
Fracture	Flexible - Flexible fragments.
Streak	Red

Source and Occurrence

..... माक्षीकभूम्युद्भौ।। (A.P.4/129)

According to Ayurveda Prakasha, Chapala is available in mines of makshika.

यत्रजातौ नागवङ्गौ चपलस्तत्र जायते (R.J.N)

According to Rasa Jala Nidhi, it is available in the mines of naga and vanga.

Selenium occasionally occurs uncombined and usually is found in conjunction with Copper and Sulphur (copper pyrite). It is also found with sulfides as selenides in ores of Iron, Lead and Silver.

Types

गौरः श्वेतोऽरुणः कृष्णश्चपलस्तु चतुर्विधः। हेमाभश्चैव ताराभो विशेषद्रसबन्धनः।।
शेषौ तु मध्यौ लाक्षावच्छीघ्रद्रावौ तु निष्फलौ। (R.R.S.2/142-143)

Chapala is of 4 types Based on the Colour:

1. Goura 2. Shweta 3. Aruna 4. Krshna

Among the above 4 types, Goura and Shweta are useful, specially for Rasa bandhana. Remaining 2 varieties are of medium quality and if they melt like Laksha, when subjected to heat, then they are useless.

Grahya Lakshana/ Swaroopa

चपलः स्फटिकच्छायः षडस्रः स्निग्धको गुरुः। (R.R.S.2/145)

Genuine Chapala have the following characteristics:

1. Sphatika chaya - appearance of Sphatika (quartz).
2. Shadasra - it has six facets.

3. Snigdha - unctuous, smooth on touch.
4. Guru - heavy.

Nagasambhuta Chapala and Vangasambuta Chapala

त्रिंशत्पलामितं नागं भानुदुग्धेन मर्दितम्। विमर्द्य पुटयेत्तावद्यावत्कर्षांश शेषितम्।।
न तत्पुटसहस्रेण क्षयमायाति सर्वथा। चपलोऽयं समादिष्टो वार्तिकैर्नागसंभवः।।
इत्थं हि चपलः कार्यो वङ्गस्यापि न संशयः। तत्स्पृष्टहस्त संस्पृष्टः केवलो बध्यते रसः।। (R.R.S.8/41-43)

30 palas (1440 gms) of Naga is powdered and triturated with Arka ksheera. After drying, it is confined to Sharava samputa and subjected to Gajaputa. The whole procedure is done repeateadly till 1 Karsha (12 gms) of Naga remains. It might require to subject more than thousand puta to reach that quantity. The resultant substance is called Nagasambhuta Chapala.

Vangasambuta Chapala is also obtained in the same way as the Nagasambhuta Chapala. Such Chapala, if smeared to hands and touch the Parada, the Parada becomes Baddha.

These are the artificial method of preparation of Chapala. As Chapala was rare mineral and have significant role in Lohaveda, artificial method of preparation was explained in classics.

Shodhana

जम्बीरककोंटकशृङ्गवेरैर्विभावनाभिश्चपलस्य शुद्धः। (R.R.S.2/16)

Chapala will get purified by subjecting it to trituration with Jambeera Rasa, Karkotaka Rasa and Shrngavera Rasa.

S.No.	Drugs used	Method of Shodhana	Reference
1	Jambeera Rasa, Karkotaka Rasa and Shrngavera Rasa	Bhavana	RR.S.2/147

Properties and Therapeutic Uses

चपलो लेखनः स्निग्धो देहलोहकरो मतः। रसराजसहाय स्यात्तिक्तोष्णमधुरा मतः।।
त्रिदोषघ्नोऽतितृष्यश्च रसबन्धविधायकः।। (R.R.S.2/144-145)

Rasa	Madhura
Guna	Snigdha, Guru, Teekshna
Veerya	Ushna
Doshaghnata	Tridoshaghna
Karma	Lekhana, Dehasiddhikara, Lohasiddikara, Atyanta Vrishya, Parada bandha karaka
Prayoga	Gulma, Ama, Shula, Shosha, Prameha, Jwara, Swetapradara, Rakta pradara.

Dose

Dose of Chapala bhasma is not mentioned in any of the Rasa granthas except Rasayoga sagara. In Rasa yoga Sagara, it has mentioned as 1 Ratti pramana (125 mg) for rasayanaartha.

Anupana

In Rasa prayoga vidhi, anupana is mentioned as Madhu, Ghrita, Dugdha, Surasadi Gana dravya kashaya, Triphala kwatha depending upon the diseases.

Satwapatana

शैलं तु चूर्णयित्वा तु धान्याम्लोपविषैर्विषैः। पिण्ड बद्ध्वा तु विधिवत्पातयेच्छपलं तथा।। (R.R.S.2/147)

Chapala shila is powdered in khalwa yantra and triturated with Dhanyamla (Kanji), Visha and Upavisha varga dravya rasas, made into balls, dried and subjected to satwapatana process to extract satwa out of Chapala.

Important Formulations

1. Chapala Rasa
2. Trailokyaadambara Rasa
3. Sarwa jwarari Rasa
4. Purna chandro Rasa

Research Updates

Prasanna Mathad et al, **Safety profile of Chapala bhasma with special reference to Bismuth and Selenium.** Int. J. Res. Ayurveda Pharm. 2022;13(6):71-75

Bismuth Clax has shown considerable changes in histopathology reports and fewer changes in Selenium clax. The Chapala bhasma prepared by Bismuth and Selenium was nontoxic and Selenium clax showed more safety profile than Bismuth clax.

Rasaka

CHAPTER TEN

Rasaka is the mineral drug belonging to Maharasa varga. Chemically, it is the Zinc compound. In practice instead of Rasaka, the mangalore tiles are used as a substitute, but it does not contain zinc. It contain only sand and iron.

Synonyms

खर्परः खर्परश्चैव तदेव खर्परीयकम्। रसको रसकश्चैव मतं यशदकारणम्।। (R.T.21/181)

Kharpara	Kharpariyaka	Rasaka	Yashadakarana	Ritikrta	Rasodbhava
Tamraranjaka	Netrarogari	Gobhatta	Gobaddha	Kshitikitta	

Vernacular Names:

Sanskrit	:	Rasaka	Kannada	:	Kharpara
English	:	Zinc ore or Calamine	Hindi	:	Khapariya

Minerological Identification

Rasaka is found as a form of a mineral, containing Zinc compounds. Zinc is never found pure in nature, it occurs combined with sulphur in a mineral called Sphalerite or Zinc blende. Another mineral is Smith sonite, contain zinc carbonate ($Znco_3$). It is formed by the action of carbonated water on Zinc sulphide (ZnS). Other zinc containing minerals are Calamine, Zincite, Franklinite and Willemite, among which Zincite (ZnO) is used for the medicinal purpose.

Based on their characteristics, the following Zinc mineral can be equated with different types of Kharpara

1. Mrittikakara - Zinc oxide.
2. Gudabha - Zinc sulphide.
3. Pashanabha - Zinc silicate or zinc carbonate.

Properties

Chemical composition	Zinc oxide (ZnO) Zn- 80.34%, O-19.65% Traces of Mn and Fe	Zinc Sulphide (ZnS) Zn - 67%, S-33%, Fe-26% Traces of Mn, Cd, Th, Hg, Sn	Zinc Carbonate ($ZnCO_3$) ZnO- 64.8%, CO_2- 35.2% Traces of Fe, Cu, Mn, Ca, Mg
Colour	Dark red, Orange, Yellow	Pure white commonly yellow, red, black, green	Green Brown also White blue Green pink
Luster	Adamantine to vitreous	Adamantine	Vitreous to Pearly
Crystal habit	Hexagonal	Cubic	Hexagonal crystals - Usually Small round and curved
Cleavage	Perfect	Perfect	Perfect
Specific Gravity	5.7	3.9 - 4.2	4.1- 4.5
Diaphaneity	Translucent to opaque	Transparent to Translucent	Translucent to Opaque
Hardness (Moh's Scale)	4 - 4.5	3.4 - 4	4.5
Fracture	Conchoidal	Uneven to Conchoidal	Uneven Subconchoidal
Streak	Yellowish orange	Brownish white, Pale yellow	White

Source and Occurrence

The ores of Rasaka (Jasada -zinc) mines are abundant in Rajasthan. The other sources are Bihar, Bengal, Kashmir, Punjab, Sikkim and Himachal Pradesh. Other than India, its ores are found in USA, Australia, France, Spain and Myanmar.

Types

मृत्तिका गुडपाषाणभेदतो रसकस्त्रिधा। पीतस्तु मृत्तिकाकारो मृत्तिकारसको वरः।।
गुडाभो मध्यमो ज्ञेयः पाषाणाभः कनिष्ठकः।। (Rasarnava 7/28-29)

According to Rasaarnava, Rasaka is of 3 types

1. Mruthikabha - Peeta varna- Uttama.
2. Gudabha - Madyama.
3. Pashanabha - Adhama.

रसको द्विविधः प्रोक्तो दुर्दुरः कारवेल्लकः। सदलो दुर्दुरः प्रोक्तो निर्दलः कारवेल्लकः।
सत्त्वपाते शुभः पूर्वो द्वितीयश्चौषधादिषु।। (R.R.S.2/149-150)

Based on the Structure, Rasaka is of 2 types

1. Dardura - Dalayukta-best for Satwapatana.
2. Karavellaka - Nirdala- best for medicinal use.

Grahya Lakshana/Swaroopa

खर्परोऽतिखरश्चैव सदलो निर्दलस्तथा। मृत्तिकाभश्च पीताभो भाराढ्यश्चेह शस्यते।। (R.T.21/182)

Genuine Kharpara will have the following characteristics:

1. Ati khara- more rough
2. Sadala nirdala- with or without dala (Laminae)
3. Mrittikabha- appears like mud
4. Peetabha- yellow in colour
5. Bhaaradya- heavy

Ashuddha Kharpara Sevanajanya Dosha

अशुद्धखर्परः कुर्याद्वान्ति भ्रान्ति विशेषतः। तस्माच्छोध्यः प्रयत्नेन यावद्वान्तिविवर्जितः।। (A.P.2/283)

Ingestion of Ashuddha Kharpara Causes

1. Vanti (Vomitting)
2. Bhranti (Giddiness)

Therefore, it is mandatory to do shodhana before its therapeutic usage to avoid untoward effects.

Shodhana

I Method

कटुकालाबुनिर्यास आलोढ्य रसकं पचेत्। शुद्धं दोषविनिर्मुक्तं पीतवर्णं तु जायते।। (R.R.S.2/154)

Kharpara will get purified by boiling it in the Katutumbi rasa and stirring it well. By this, Kharpara will get rid of its doshas and attains yellow colour.

II Method

प्रस्तरांशपरित्यक्तं खर्परं त्यथ खल्वगम्। निम्बूकस्वरसोपेतं पेषयेत्सप्तवारकम्।। (R.T.21/186)

Kharapara which is devoid of physical impurities is taken in Khalva yantra and powdered into fine form. Then, this is added with required quantity of Nimbu rasa and triturated well. By repeating the whole process for 7 times, Kharapara will become shuddha.

S.No.	Drugs used	Method of Shodhana	Reference
1	Katutumbi rasa	Pachana (Boiling)	R.R.S.2/15, A.P.2/287
2	Human urine or Horse urine or Butter milk	Nirvapa for 7 times	R.R.S.2/156 A.P.2/286
3	Nimbu Rasa	Bhavana for 7 times	R.T.21/186
4	Beejapoora Rasa	Nirvapa for 7 times	R.R.S.2/155, A.P.2/285
5	Human urine	Soaking for 1 month	R.R.S.2/156 A.P.2/288
6	Nimbu Rasa	Nirvapa for 7 times	R.T.21/18

Marana

I Mthod

खर्परं पारदेनैव चूर्णयित्वा दिनं पचेत्। वालुकायन्त्रमध्यस्थं शोणं भस्म प्रजायते।। (A.P.2/289)

Equal quantity of Shuddha Kharpara and Shuddha Parada is taken in Khalva yantra and rubbed well to make a uniform mixture. This mixture confined to Sharava samputa and heated by placing it in the midst of valuka yantra for 1 day. This will yield the Kharpara bhasma which is yellowish in colour.

II Method

खर्परो विमलः शुद्धस्तुल्यतालकपेषिनः। सम्पुटस्थस्त्रिपुटितः सर्वथा मृतिमाप्नुयात्।। (R.T.21/193)

Equal quantity of Shuddha Kharpara is taken in Khalva yantra along with Shuddha Haratala and triturated well to make a uniform mixture. This mixture enclosed in Sharava samputa and subjected to Puta (Laghu puta). This whole procedure repeated for 3 times to get Kharpara bhasma.

S.No	Drugs used	No. and Type of Puta	Reference
1	Shuddha Parada	Heated in Valuka yantra for 1 day.	A.P.2/289
2	Shuddha Haratala	3 Putas (Laghuputa)	R.T.21/193
3	Only Shuddha Kharpara churna	Heated in Valuka yantra or Lavana yantra.	A.P.2/290

Properties and Therapeutic Uses

खर्परं कटुकं क्षारं कषायं वामकं लघु।
लेखनं भेदनं शीतं चक्षुष्यं कफपित्तनुत्।।
विषाश्मकुष्टकण्डूनां नाशनं परमं मतम्।। (A.P.2/277-280)

Rasa	Katu, Kashaya
Guna	Laghu, Rooksha
Veerya	Sheeta
Vipaka	Katu
Doshaghnata	Kaphapittahara, Tridoshahara
Karma	Lekhana, Bhedana, Chakshusya, Mehaghna, Vishaghna, Kushtaghna, Balavardhaka, Veeryavardhaka, Yogavahi.
Prayoga	Kshaya, Meha, Kushta, Vishadosha, Jeerna jwara, Yoniroga, Rakta Pradara, Raktapitta, Kasa, Shwasa, Gulma, Hikka, Atisara, Gudaja roga

Dose

गुञ्जार्द्धतः समारभ्य गुञ्जाद्वितयसंमिता। खर्परस्य मता मात्रा रोगापनयनक्षमा।। (R.T.21/197)

Considering the relevant factors of the disease, Kharpara can be administered in the dose of ½ - 2 Ratti (62-250 mg).

Management of Ashuddha, Apakwa and Avidhee Sevanajanya Dosha of Karpara

रसकनिषेवणतो यदि रोगाः प्रादुर्भवन्ति मनुजानाम्।
तेनाशमाप्नुवन्ति पीतं गोमूत्रसप्ताहात्।। (B.R.R.S)

If any untoward effect observed by the administration of Kharpara, then Gomutra is advised to consume for a week as an antidote.

Satwapatana

साभयाजतुभूनाग निशाधूमज टङ्कणम्।
मूकमूषागतं ध्मातं सत्त्वं मुञ्चति खर्परम्।। (R.R.S.2/162)

One part of Shuddha kharpara and one fourth part of each of Haritaki, Shilajatu (or Laksha), Bhoonaga, Haridra, Grihadhooma and Tankana are taken together in Khalva yantra and rubbed to make it an uniform mixture. This mixture is enclosed in Musha and heated in an intense fire to extract the satwa from Kharpara.

Satwa Marana

तत्सत्त्वं तालकोपेतं प्रक्षिप्य खलु खर्परे। मर्दयेल्लोहदण्डेन भस्मी भवति निश्चितम्।। (R.R.S.2/167)

Equal quantity of Kharpara satwa and Shuddha Haratala is taken in iron pan and kept on fire. Heating is done with continuous stirring till the Kharpara satwa bhasma is obtained.

Important Formulations

1. Kasthuri bhairava Rasa
2. Pradarantaka Rasa
3. Lakshmivilasa Rasa
4. Vaidyanatha vati
5. Sannipatantaka Rasa
6. Vasantamalati Rasa
7. Mahajwarankusha Rasa

Research Updates

1. Shubha HS et al, **Preparation and physicochemical analysis of Rasaka Bhasma.** Ayu. 2010 Oct;31(4):509-10

   After using classical parameters for the identification of *Rasaka*, two samples were taken up for analysis: $ZnCO_3$ and ZnO there was a difference in the pH of the samples before *Shodhana*, after *Shodhana*, and after *Marana*. The pH of zinc carbonate before *Shodhana* was 8.73, after *Shodhana* 7.79, and after Marana 7.73. In the case of zinc oxide, the pH was 6.04 before *Shodhana*, 6.48 after *Shodhana*, and 5.9 after *Marana*. There was an increase in the percentage of zinc in the ash of $ZnCO_3$ because of the calcination reaction. However, in the case of ZnO there was reduction in the percentage of zinc because of the oxidative reaction.

2. Shubha HS et al,**Evaluation of antimicrobial activity of Rasaka Bhasma.** Ayu. 2010 Apr;31(2):260-2.

   Antimicrobial result of Rasaka bhasma prepared out of $ZnCO_3$ has shown a better result than Rasaka bhasma prepared out of ZnO. Bhasma prepared out of $ZnCO_3$ has shown better antimicrobial results over *Str.* pyogenes compared to other organisms at the concentration of 50 μl.

Anjana

CHAPTER TEN

Anjana is one among the Uparasa drugs. Anjana refers to the set of 5 drugs which are said to be the types of Anjana. Though there are no similarity in their chemical composition (except Srotanjana and Souvirnjana which are Antimony sulphide) or properties, still categorised under Anjana as they are used as topical application for Netras.

अञ्जनं क्रियते येन तद् द्रव्यं चाञ्जनं स्मृतम्। (R.S.S)

One which is used for the application to the eyes in the form of Anjana is called as Anjana

Types

सौवीरमञ्जनं प्रोक्तं रसाञ्जनमतः परम्।
स्रोतोञ्जनं तदन्यच्च पुष्पाञ्जनकमेव च।।
नीलाञ्जनं च तेषां हि स्वरुपमिह वर्ण्यते। (R.R.S.3/98)

There are 5 types of Anjana

1. Sauviranjana
2. Srotanjana
3. Neelanjana
4. Pushpanjana
5. Rasanjana

According to Rasajala nidhi, 6 types

1. Sauviranjana
2. Srotanjana
3. Neelanjana
4. Pushpanjana
5. Rasanjana
6. Kulatthanjana

According to R.T., 2 types

1. Srotanjana
2. Sauviranjana

According to A. P., 2 types

1. Shwetanjana
2. Krishnanjana

Sources and Occurrence

According to Rasakamadhenu, Anjana is obtained from mountains as well as rivers (शैल भवानि). Anjana is found in both natural and artificial form. Sauviranjana, Srotanjana and Neelanjana are found naturally, whereas Pushpanjana and Rasanjana are prepared artificially. Sauviranjana is available in Simhabhumi of Hajaribag of Bihar, Andrapradesh, Jammu, Nepal, Burma, Pakistan, Afghanistan. Srotanjana is available in Simhabhumi of Bihar, Punjab. Pushpanjana is available in Kashmir, Punjab, Bihar, Orissa.

Synonyms

1. Sauviranjana

सौवीराञ्जनकं ख्यातं सौवीरं तु सुवीरजम्। कृष्णाञ्जनं तथा कालाञ्जनञ्चापि प्रकीर्तितम्।। (R.T.22/37)

Sauviranjana	Sauvira	Suveeraja	Krishnajana	Kalanjana	Suveeraka

2. Srotanjana

स्रोतोऽञ्जनं तु स्रोतोजं यामुनेयञ्च यामुनम्। (R.T.22/36)

Srotanjanam	Srotojam	Yamuneya	Yamunam	Kapotanjana

3. Neelanjana

Shakrabhoomija	Varisambhava	Suvarnaghnam	Lohamardavakara

4. Pushpanjana

Kumudanjana	Pushpaketu	Kousthubha	Reetija	Reetipushpaka

5. Rasanjana

Rasagarbha	Rasagraja	Rasodbhava	Tarkshya	Tarkshyashaila
Kataka	Balabhaishajya	Darvikwathodbhava	Varyanjana	Agnisara

Vernacular Names

Sanskrit - Anjana
English - Collyrium
Hindi - Anjan
Kannada - Anjana

Minerological Identification

Both Souviranjana and Srotanjana are the Antimony compounds, i.e. Stibnite (Sb_2S_3) along with the traces of Lead, Silver & Arsenic.

Properties

Chemical composition	Sb_2S_3. Sb - 71.4%, S - 28.6%. Small amount of Iron and traces of Lead, Silver and Arsenic
Colour	Lead gray
Luster	Metallic
Crystal habit	Massive, radiating and elongated crystals; Orthorhombic
Cleavage	Perfect
Specific Gravity	4.65
Diaphaneity	Opaque
Hardness (Moh's Scale)	2
Fracture	Subconchoidal
Streak	Similar to colour, but darker

Neelanjana is the Galena, which is chemically Lead sulphide (PbS).

Chemical composition	PbS
Colour	Lead gray and Silvery
Luster	Metallic on cleavage planes
Crystal habit	Cubic
Cleavage	Perfect
Specific Gravity	7.2-7.6
Transparency	Opaque
Hardness (Moh's Scale)	2.5-2.75
Fracture	Subconchoidal
Streak	Lead gray

Pushpanjana

Though there are different opinions regarding Pushpanjana, it can be taken as a drug which is chemically ZnO.

Rasanjana

Rasanjana used in present day is the kritrima variety, which is prepared by ghanakriya of Darvikwatha and Ajadugdha.

Grahya Lakshana/Swaroopa

1. Souviranjana

बाह्यतः खलु धूमाभं भङ्गे त्वतिसमुज्ज्वलम्। घर्षे खलु मषीवर्णं सौवीराञ्जनमुच्यते।। (R.T.22/39)

Characteristics features of Souviranjana are:

1. Bahyataha dhoomabham- externally smoke colour.
2. Bhange atisamujwalam- when broken, it appears very shining.
3. Gharshe masheevarnam- when rubbed over rough surface, blackish lines appears.

2. Srotanjana

भङ्गे नीलोत्पलनिभं घर्षणे गौरिकप्रभम्। वल्मीकशीर्षप्रतिमं मतं स्रोतोऽञ्जनं बुधैः।। (R.T.22/38)

Characteristics features of Srotanjana are:

1. Bhange neelotpalanibham- when broken, exhibits blue lotus colour.
2. Gharshane gairika prabham- when rubbed over rough surface, reddish lines like Gairika.
3. Valmikasheersha pratimam- resembles the shape of the head/top of anthill.

3. Neelanjana

Characteristics features of Neelanjana are:

1. Neela varna- Blue colour
2. Guru- Heavy

4. Pushpanjana

पुष्पाञ्जनंसितं। (R.R.S.3/104)

1. It is Shweta varna- white in colour.

5. Rasanjana

रसाञ्जनंचपीताभं। (R.R.S.3/102)

1. It is peeta varna- Yellowish colour.

6. Shodhana

General Method

अञ्जनानि विशुद्ध्यन्ति भृङ्गराजनिजद्रवैः। (R.R.S.3/105)

CHAPTER TEN

All types of Anjana get purified by triturating them with Bhrngaraja Swarasa for 7 times.

Souviranjana and Srotanjana Shodhana

त्रिफलावारिणि स्वेद्यं तद्द्वयं शुद्धिमृच्छति। भृङ्गराजरसेवाऽपि स्रोतः सौवीरकं शुचिः।। (A.P.2/232)

Srotanjana and sauviranjana get purified by subjecting it to swedana using Triphala jala or Bhrngaraja swarasa.

Neelanjana Shodhana

नीलाञ्जनं चूर्णयित्वा जम्बीररसभावितम्। दिनैकमातपे शुद्धं भवेत्कार्येषु योजयेत्।। (A.P.2/238)

For the shodhana of Neelanjana, it should be powdered in khalva yantra and subjected to bhavana with jambeera rasa after which it should be dried in sun for a day. By this, Neelanjana becomes purified and can use for therapeutic purpose.

Rasanjana Shodhana

सूर्यावर्त्तादियोगेन शुद्धिमेति रसाञ्जनम्। (R.R.S.3/105)

Rasanjana will get purified by subjecting it to bhavana with swarasa or kwatha of any of the drugs in the Suryavartadi yoga. Suryavaratadi yoga includes Suryavartaka, Kadali, Vandhya, Koshataki, Suradali, Shigru, Vajrakanda, Neerakana and Kakamachi.

S.No.	Type of Anjana	Drugs used	Method of Shodhana	Reference
1	General method for all types of Anjana	Bhrngaraja Sawrasa	7 Bhavana	R.R.S.2/129
2	Souviranjana and Srotanjana	Triphala kwatha/ Bhrngaraja swarasa	Swedana for 3 hours	A.P.2/232
3	Neelanjana	Jambeera swarasa	Bhavana for 1 day and dried in sun	A.P.2/238
4	Rasanjana	Suryavartadi yoga dravyas Rasa	Bhavana	R.R.S. 3/105

CHAPTER TEN

Marana

Marana is not required for Anjanas. They are used for therapeutic purpose after shodhana.

Properties and Therapeutic Uses

1. Souviranjan

Rasa	Katu, Kashaya, Tikta
Guna	Snigdha
Veerya	Sheeta

Vipaka	Madhura
Doshaghnata	Tridosha hara
Karma	Vrana shodhana, Ropana, Drushti prasadana, Sangrahi, Vayasya, Netrya, Lekhana
Prayoga	Raktapitta, Vamana, Hikka, Akshiroga, Vrana, Kshaya, Raktarshas, Karnaroga, Visharoga

2. Srotanjana

Rasa	Kashaya, Madhura
Guna	Snigdha
Veerya	Sheeta
Vipaka	Madhura
Doshaghnata	Tridosha hara
Karma	Grahi, Netrya, Lekhana
Prayoga	Kapha, pitta & Raktaroga, Vamana, Hikka, Akshiroga, Visharoga

3. Neelanjana

Guna	Snigdha, Guru
Veerya	Sheeta
Doshaghnata	Tridosha hara
Karma	Rasayana, Netrya, Suvarna maraka, Dhatu mrudukaraka
Prayoga	Akshiroga, Dhatumarana

4. Pushpanjana

Rasa	Kshariya
Guna	Snigdha, Sheeta
Veerya	Sheeta
Doshaghnata	Tridosha hara
Karma	Netrya, Vishaghna, Jwaraghna
Prayoga	Akshiroga, Visharoga, Bhayankara Hikka, Jwara

5. Rasanjana

Rasa	Madhura, Tikta, Katu
Guna	Snigdha, Sheeta
Veerya	Sheeta

Doshaghnata	Tridosha hara
Karma	Netrya, Vishaghna, varnya
Prayoga	Akshiroga, Visharoga, Shwasa, Hikka, Mukha roga

Dose

गुञ्जार्धतः समारभ्य गुञ्जैकमितमञ्जनम्। दिनद्वयं त्रयं वापि प्रयुञ्जीत भिषग्वरः।। (R.T.22/47)

The dose of Anjana is ½ - 1 Ratti (62-125 mg) administered for 2-3 days.

Satwapatana

स्रोतः सौवीरयोः सत्त्वं गृह्णीयात्कुशलो भिषक्। मनःशिलाविधानेन तन्नेत्र्यं परमं मतम्।। (A.P.2/233)

The extraction of satwa from the Srotanjana and Sauviranjana is similar to that of Manashila satwapatana. The satwa of Anjana are good for eyes and cure eye disorders.

Important Formulations

1. **Sauviranjana** - Tuhinanjana, Timiraharananjana, Sheegraprabhava rasa.
2. **Srotanjana** - Rasendra mangala rasa, Chandabhairava rasa.
3. **Neelanjana** - Vatari rasa, Timiraharananjana, Amrutarnava rasa, Vadavanala rasa.
4. **Pushpanjana** - Churnanjana.
5. **Rasanjana** - Ashoka ghrita, Pushyanuga churna, Patrangasava, Peeyushavalli rasa.

Kankustha

Kankushta is one among the Uparasa. There are difference of opinion regarding its identity since ancient times. In Rasaratna Samuchchaya, the author has quoted different opinions about Kankushta.

Synonyms

Kakakankushta	Kolabaluka	Talakushta	Viranga	Rangadayaka
Hemavati	Varanga	Swarnaksheeriniryasa	Rechaka	Teekshnadugdhika

Identification

There are different references in Ayurveda granthas referring to different substances under the name Kankushta. All authors claim the property of kankusta as purgative in nature. By considering the explanation available about Kankushta, it is more likely can be compared with the resin of the Mysore Gambose tree.

Sources and Occurrence

हिमवत्पादशिखरे कङ्कुष्ठमुपजायते। (R.R.S.3/109)

According to R.R.S., Kankushta is available at the foothills of Himalaya.

Now a days, Kankushta available in market is nothing but the resin of Mysore Gambose tree. An incision is done at the base of Gambosa tree to which a tube is fixed. In this, the resinious substance get accumulates which is collected, dried and preserved. Now a days, this is imported from Burma, Indonesia, Singapore, Malaysia.

Types

तत्रैकं नालिकाख्यं हि तदन्यद्रेणुकं मतम्। (R.R.S.3/109)

According to Rasa ratna samuchchaya, Kankushta is of 2 types:

1. **Nalika** : In the form of Nali (tube).
2. **Renuka** : In the form of powder/granules.

According to Bhava Prakasha, Kankushta is of 2 types:

1. Raktakaka
2. Andaka

Grahya Lakshana

पीतप्रभं गुरु स्निग्धं श्रेष्ठं कङ्कुष्ठमादिमम्। (R.R.S.3/110)

Characteristics of the best Kankushta (Nalika variety) are:

1. Peetaprabha- yellow in colour
2. Guru- heavy
3. Snigdha- Unctous

Agrahya Lakshana

श्यामपीतं लघु त्यक्तसत्त्वं नेष्टं हि रेणुकम्। (R.R.S.3/110)

Kankushta having the following characteristics are need to be discarded:

1. Shyamapeeta- Blackish yellow in colour.
2. Laghu- Light.
3. Tyakta satwa- having no essence in it.
4. Renuka- Renuka variety Kankushta which is in powder form.

Shodhana

I Method

कङ्कुष्ठं शुद्धिमायाति त्रिधा शुण्ठ्यम्बुभावितम्। (R.R.S.3/114)

Kankushta is purified by giving it the Bhavana with Shunti jala for 3 times.

S.No.	Drugs used	Method of Shodhana	Reference
1	Shunti jala	3 Bhavana	R.R.S.3/114

Properties and Therapeutic Uses

कङ्कुष्ठं तिक्तकटुकं वीर्योष्णं चातिरेचनम्।। (R.R.S.3/113)

Rasa	Tikta, Katu, Amla
Guna	Ushna, Teekshna
Veerya	Ushna
Karma	Atyanta Rechaka
Prayoga	Vrana, Udavarta, Shoola, Pleeha, Gulma, Arshas, Amavata, Jalodara

Satwa Patana

सत्त्वाकर्षोऽस्य न प्रोक्तो यस्मात्सत्त्वमयं हि तत्।। (R.R.S.3/114)

As Kankushta is in the form of satwa, there is no necessity of extracting Satwa from it.

Dose and Anupana

भजेदेनं विरेकार्थं ग्राहिभिर्यवमात्रया। नाशयेदामजार्तिं च विरच्य क्षणमात्रतः।।
भक्षितः सह ताम्बुलैर्विरिच्यासून्विनाशयेत्।। (R.R.S.3/115-116)

For virechana, Kankushta is given in the dose of 1 yava (30 mg) along with grahi dravyas like Jeeraka, Shunti and others.

For immediate and more effective virechana, 1 yava of kankushta is consumed along with Tambula patra (Betel leaves). But it should administer with at most care because due to drastic purgation, the patient may suffer extremely, even may lead to death.

Management of Ashuddha, Apakwa and Avidhee Sevanajanya Dosha of Kankushta

बर्बुरीमूलिकाक्वाथ जीरसौभाग्यकं समम्। कङ्कुष्ठं विषनाशाय भूयो भूयः पिबेन्नरः।। (R.R.S.3/117)

If any poisonous effect of Kankushta is observed, then the Babbula moola kwatha is consumed repeatedly along with the Jeeraka and Tankana.

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Important Formulations

1. Dhanwantari Ghrta
2. Dhanwantari Rasa
3. Udavartahara Ghrta
4. Mritasanjeevini Rasa
5. Shothodarari Rasa
6. Jyothisman Rasa

Peetarasa (Ref Ayurvedic formulary part-I Govt of A.P)

Agnijara

Agnijara is one among the drug of Sadharanarasa. It is an marine product available in sea and it is jangama dravya as its source is the marine animal. It is named as Agnijara because it is mentioned as the product of the marine fish named Agninakra.

Synonyms

Agnija	Agnigarbha	Agniniryasa	Agnijwala	Samudrajarayu
Vadavagnimala	Agnijara	Vahnijara	Sindhuphala	Arnavodbhava

Vernacular Names

Sanskrit - Agnijara

English - Ambergris

Hindi - Ambar

Properties

Physical Properties- It is a solid, waxy, flammable substance of a dull gray or blackish color produced in the digestive system of sperm whale.

Specific gravity : 0.780-0.926

Melting point : 62 °C

Voltalises at 100°C

Chemical Properties- Ambergris is relatively nonreactive to acid. White crystals of a substance called ambrein can be separated from ambergris by heating raw ambergris in alcohol, then the resulting solution to cool.

Sources and Occurrence

Ambergris found floating upon the sea, or over the sand near the coast. It is a biliary secretion of intestine of sperm whale, and also sometimes found in the abdomen of whales. It is obtained from the seashores of India, Sri Lanka, Lakshadweep, Nicobar and Africa.

Shodhana

यदब्धिक्षारसंशुद्धस्तस्माच्छुद्धिर्न ह्यिष्यते।। (R.R.S.3/136)

As it is found naturally in sea water which is having alkaline quality, it does not require any purification.

Properties and Therapeutic Uses

स्यादग्निजारः कटुकोष्णवीर्यः तुन्दामयघ्नः कफवातहारी।
पित्तः प्रदः शोणितसन्निपातशूलादिवातामयनाशकश्च।। (A.K.1/233)

अग्निजारस्त्रिदोषघ्नो धनुर्वातादिवातनुत्। वर्द्धनो रसवीर्यस्य दीपनो जारणस्तथा।। (R.R.S.3/136)

Rasa	Katu
Guna	Laghu, Ushna
Vipaka	Katu
Veerya	Ushna

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Doshaghnata	Kapha Vata hara
Karma	Deepana, Pachana, Grahi, Hridya, Vajikara, Balya, Parada deepana and Jarana
Prayoga	Rakta roga, Dhanurvata, Vatavyadhi, Medoroga, Shula, Grahani, Pratisyaya, Pakshaghata, Parada becomes sparshavedhi by its use

Dose

¼ - ½ Ratti (30-60 mg)

Anupana

Madhu, Ghrita, Navaneeta

Important Formulations

1. Brihat vatachintamani Rasa
2. Chintamani Rasa
3. Jaharmohara Vati
4. Yakuti
5. Dhatri Rasayana
6. Vadavanala Rasa
7. Ratneshwara Rasa

Giri Sindura (Rex Oxide of HG)

Girisindhura is included under Sadharana rasa by almost all Rasa texts, but in Bhavaprakasha and Rasatarangini, it is included under Upadhatu. There is a controversy regarding its identity as no much details found about this drug and also minimum usage of Girisindhura is seen for its therapeutic purpose.

Synonyms

सिन्दूरं गिरिसिन्दूरं महिलाभालभूषणम्। गणेशभूषणञ्चैव तथा शृङ्गार भूषणम्।।
नागजं नागगर्भञ्च तथैव नागरेणुकम। मङ्गल्यं भालसौभाग्यं तदेव परिकीर्तितम्।। (R.T.21/148-149)

Sindura	Bhala Soubhagya	Mahila Mala-bhooshana	Ganesha Bhooshana	Sringara Bhooshana
Nagaja	Nagagarbhaja	Nagarenuka	Mangalya	Girisindura
Rasagarbha	Vasantamangala	Nagarakta	Raktaraja	Vanapishta

Vernacular Names:

Sanskrit - Girisindura
English - Montroydite, Red oxide of mercury
Hindi - Inglur, Giri sindur
Kannada - Giri sindoora

Minerological Identification

Rasataranginikara clearly mentioned Girisindura as a lead oxide and addition to it by seeing the synonyms it can be inferred as it is originated from Naga. But Many

authors called it as a red oxide of mercury and its description closely resembles to Montroydite, a mineral of mercury oxide.

Properties

Chemical composition	HgO
Colour	Deep red, brownish red to brown
Luster	Sub-adamantine Vitreous
Crystal system	Orthorhombic
Cleavage	Perfect
Specific Gravity	11.23
Diaphaneity	Transparent to translucent
Hardness (Moh's Scale)	1.5-2.0
Fracture	Sectile
Streak	Reddish orange

Sources and Occurrence

It is found naturally and also prepared artificially.

महागिरिषु चाल्पीयः पाषाणान्तः स्थितो रसः। शुष्कशोणः स निर्दिष्टो गिरिसिन्दूर संज्ञया।। (R.R.S.3/137)

Girisindura is red colored dry mercury powder, found in small quantities inside the rocks in very high mountains. In India, it is found in Kashmir, Punjab and Rajasthan. It is also prepared artificially by using lead. According to Rasamruta, lead is kept in crucible or iron pan and heated in an open atmosphere, to get combines with the oxygen and form a red colour Sindura. While collecting the material initial and last portions should be discarded and remaining portion is then washed with water and dried. The Sindura, which is red, heavy, fine and smooth, is considered best.

Types

According to R.J.N., Sindura is of 2 types:

1. **Girisindura-** Occurs naturally in mountains, bright red in colour, lustourous, contains Mercury and Oxygen.
2. **Nagasindura-** Artificially prepared, light red in colour, non-lustourous, contains Lead and Oxygen.

Grahya Lakshana

अतिसूक्ष्मकणं स्निग्धं गुरु वर्णसमुज्ज्वलम्। मृदुलं विमलञ्चैव सिन्दूरं जात्यमुच्यते।। (R.T.21/150)

Characteristics of genuine Girisindura are:

1. **Ati Sukshma kanayukta** - Contains very minute particles.
2. **Snigdha** - Unctous.

3. Guru - Heavy.
4. Varna samujwalam - Bright in colour.
5. Mrudu - Soft.
6. Vimala - Clear.

Shodhana

There are no references of shodhana or Marana for Girisindura. It is used for external purpose only.

Properties and Therapeutic Uses

त्रिदोष शमनं भेदि रसबन्धनमग्रिमम्। देहलोहकरं नेत्र्यं गिरिसिन्दूरमीरितम्।। (R .R.S.3/138)

सिन्दूरं क्षुद्रकुष्ठघ्नं त्वच्यं व्रणविशोधनम्। भग्नसन्धानजननं तथैव व्रणरोपणम्।।
पामाविचर्चिकासिध्मवीसर्पशमनं परम्। भूतघ्नञ्च विशेषेण रक्तदोषनिषूदनम्।। (R.T.21/151-152)

Rasa	Katu, Tikta
Guna	Ushna
Veerya	Ushna
Doshaghnata	Tridosha hara
Karma	Twachya, Netrya, Vranashodhaka, Vranaropana, Bhagnasandanaka, Bhootaghna, Dehalohakara, Rasabandakara
Prayoga	Pama, Vicharchika, Sidhma, Visarpa, Kushta, Kandu, Visphota, Visha, Netraroga, Padasputana, Raktadosha

Dose

Used for external purpose only.

Important Formulations

1. Sinduradi Malahara
2. Padadari Malahar
3. Sinduradya Taila

Mriddara Shringa (Litharge)

Mriddara shringa is categorised under Sadharana rasa as it is one of the important drug used for the Rasabandhana. For the therapeutic purpose, it is mentioned only for external use and no references are seen for its internal use.

Synonyms

मृद्दारशृङ्गकञ्चैव मतं वोदारशृङ्गकम्। मुद्राशङ्खं तथा मुद्रशङ्खकञ्च निगद्यते।। (R.T.2¼65)

Mriddarashringa	Bodarashringa	Mudrashankha	Mudrashankhak

Vernacular Names

Sanskrit - Mriddarashringa

English - Litharge

Hindi - Mudrashankha

Minerological Identification

Properties

Chemical composition	PbO
Colour	Yellow
Luster	Greasy to dull
Crystal system	Tetragonal
Cleavage	Distinct/Good
Specific Gravity	9.33
Diaphaneity	Transparent
Hardness (Moh's Scale)	2
Fracture	Uneven
Streak	Yellow

Sources and Occurrence

अर्बुदस्य गिरेः पर्श्वे जातं मृद्दारशृङ्गकम्। (R.R.S.3/145)

According to classics, Mriddarashringa is available near the Arbuda mountains (Gujarat and Mount Abu). But, at present it is not found in India according to geological survey. It is imported from Myanmar, China and also it is prepared artificially.

Types

Based on the origin, Mrddirashringa is of 2 types:

1. Khanija (Prakruta) - Natural
2. Kritrima - Artificial

बोदारशृङ्गकं प्रोक्तं द्विविधं पीतपाण्डुरम्। सदलं निर्दलं तस्य जनिगुर्जरमण्डले।। (A.P.2/343)

According to A.P., there are 2 types of Mriddarashringa based on the colour:

1. Peeta
2. Pandura

2 types based on the structure:

1. Sadala
2. Nirdala

Grahya Lakshana

सदलं पीतवर्णं च भवेद्गुर्जरमण्डले। (R.R.S.3/145)

मृद्दारशृङ्गं पीताभं सदलं निर्दलं तथा। सीसगर्भं खरस्पर्शं गुरु चैव प्रकीर्तितम्।। (R.T.2½6)

The characteristics of the genuine Mriddara shringa (Seesagarbha) are:

1. Peetabha - Yellowish in colour
2. Sadala Nirdala - With layers or without layers
3. Kharasparsha - Rough touch
4. Guru - Heavy

Shodhana

I Method

मृद्वारशृङ्गमानीय कुट्टयेत् खल्वमध्यगम्।
प्रस्तरांशं परित्यज्य पेषयेदतियत्नतः।।
वस्त्रपूतं ततःकृत्वा पुनः सुविमलाम्भसा।
पेषयेत्पक्षमेकं तु ततो धर्मे विशोषयेत्।। (R.T.2½67-168)

Mriddarashringa is powdered in Khalwa yantra and stones and other physical impurities are separated. Again it is triturated to make it still fine powder and filtered through the cloth. This filtered powder is subjected to Bhavana with the clean water for 15 days and dried under sun. By this method, Mriddarashringa becomes shuddha and this can be used in various conditions for external purpose only.

Properties and Therapeutic Uses

सीससत्त्वं गुरु श्लेष्मशमनं पुंगदापहम्। रसबन्धनमुत्कृष्टं केशरञ्जनमुत्तमम्।। (R.R.S.3/146)

मृदारशृङ्गं शिशिरं परं वातकफापहम्। फिरङ्गव्रणहृत् केश्यं व्रणरोपणमुत्तमम्।।
भग्नसन्धानजननं पामाकण्डूतिकादिनुत्। सङ्कोचकं विशेषेण त्वग्दोषशमनं मतम्।। (R.T.21/170-171)

Guna	Sheeta, Guru
Veerya	Sheeta
Doshaghnata	Vata Kapha hara
Karma	Keshya, Kesharanjana Vranaropaka, Bhaghnasandanakara, Sankochaka, Twakdoshahara, Rasabandakara
Prayoga	Phiranga vrana, Pama, Kandu, Vrana, Bhaghna, Twakroga

Dose

Used for external purpose only.

Satwapatana

One part of Mriddarashringa is mixed with one fourth part each of Tankana and Charcoal powder in Khalwa yantra. The mixture is enclosed in Musha and subjected to intense heat till the satwa in the form of Naga is extracted out.

Important Formulations

Mriddarashringadya malahara.

Kamsya (Bronze)

Synonyms

कंसीयं कांस्यकं कास्यं घोषपुष्पञ्च घोषकम्। घोषो घोषं वह्निलोहं तदेव परिकीर्तितम्।। (R. T.22/21)

Kamseeyam	Kamsyakam	Kamsyam	Ghoshakam
Ghosham	Vahniloham	Tamratrapuja	Kamsya
Ghosho	Ghosha	Kamsaka	Saurastraja

Vernacular Names

Sanskrit - Kamsya
English - Bell metal/White copper/Bronze
Hindi - Kamsa
Kannada - Kanchu

Minerological Identification

Bronze is as an alloy made of copper and another metal, usually tin. Compositions vary, but most modern bronze is 88% copper and 12% tin. Bronze may also contain manganese, aluminum, nickel, phosphorus, silicon, arsenic, or zinc.

Sources and Occurrence

अष्टभागेन ताम्रेण द्विभागं कुटिलं युतम्। एकत्र द्रावितं तत्स्यात् कांस्य सौराष्ट्रजं शुभम्।। (A.P.4/61)

In ancient times, Bronze might have been produced in Saurashtra, so termed as Saurashtraja and Bronze from Saurashtra is said to be the best. It is prepared by taking 8 parts of Copper and 2 parts of Tin and melting them together.

Types

कांस्यं च द्विविधं प्रोक्तं पुष्पतैलिकभेदतः। पुष्पं श्वेततमं तत्र तैलिकं कपिशप्रभम्।
एतयोः प्रथमं श्रेष्ठं संसेव्यं रोगशन्तये।। (A.P.4/65-66)

Kamsya is of 2 types:

1. Pushpa
2. Tailika

Pushpa Kamsya is most whitish in colour and Tailika is brown in colour. Among these two types, Pushpa Kamsya is considered as best for internal administration and pacification of diseases.

Grahya Lakshana

तीक्ष्णशब्दं मृदुस्निग्धमीषच्छ्यामलशुभ्रकम्। निर्मलं दाहरक्तं च षोढा कांस्यं प्रशस्यते।। (R.R.S.5/206)

Kamsya is said to be best quality if it is having the qualities like-

1. Teekshna shabda - Produces sharp resonant sound when stuck with harder objects.

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2. Mrudu - Soft.
3. Snigdha - Slimy.
4. Ishat shyamala shubhra - Dull white in colour.
5. Nirmala - Clean.
6. Daharakta - Becomes red on heating.

Agrahya Lakshanas

तत्पीतं दहने ताम्रं खरं रूक्षं घनासहम् । मन्दनादं गतज्योतिः सप्तधा कांस्यमुत्सृजेत् ।। (R.R.S.5/207)

Kamsya having below 7 qualities must not be used for medicinal purpose:

1. Peetam - Yellowish in colour.
2. Dahane Tamra - On heating, becomes Coppery colour.
3. Khara - Rough.
4. Rooksha - Dryness in lustre.
5. Ghanasaha - Cannot bear heavy stroke (brittle).
6. Mandanada - Produces less resonant sound.
7. Gatajyothi - Non-lusterous.

Shodhana

Kamsya should subjected to samanya and Vishesha shodhana.

Samanya Shodhana

'तैले तक्रे गवां मूत्रे ह्यारनाले कुलत्थजे। क्रमान्निषेचयेत्तप्तं द्रावे द्रावे तु सप्तधा।
स्वर्णादिलोहपत्राणां शुद्धिरेषा प्रशस्यते' ।। (R.R.S. 5/13)

Kamsya Patras should be heated up to red hot on the flame and dipped into Tilataila, Takra Gomutra, Aranala, Kulattha Kwatha for 7 times in each liquid media successively.

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Vishesha Shodhana

I Method

तप्तं कांस्यं गवां मूत्रे वापितं परिशुद्ध्यति। (R.R.S. 5/209)

Kamsya Patras are heated to red hot and immersed in Gomutra for 7 times. This will purify the Kamsya patras.

II Method

सूक्ष्मपत्रीकृतं घोषपुष्पाह्वयं मूत्रपट्वन्वितं स्थालिकायां न्यसेत्।
यामसम्पाचितं तीक्ष्णतीक्ष्णाग्निना सर्वदोषोज्झितं जायते सत्वरम्।। (R.T.22/27)

Pushpa Kamsya is made into thin foils and taken in a vessel. To this, Gomutra and Saindava lavana is added and boiled well in the intense heat for 1 Yama (3 hours). This will purify the Kamsya by which it will get rid of its all types of doshas.

S.No.	Drugs used	Method of Shodhana	Reference
1	Gomutra	Nirvapa for 7 times	R.R.S. 5/209, R.T.22/26
2	Gomutra and Saindava lavana	Pachana for 3 hours	R.T.22/27

Marana

I Method

म्रियते गन्धतालाभ्यां निरुत्थं पञ्चभिः पुटैः। (R.R.S.5/210)

Equal quantity of Shuddha Gandhaka and Haratala is made into paste with Nimbu rasa and this paste is done lepa over the Shuddha Kamsya patras. Later these are dried and enclosed in sharava samputa which is subjected to Ardha Gajaputa. Such 5 putas will make the Kamsya bhasma.

II Method

कांस्यं तुल्यं शिलागन्धयुतं कन्याम्बुपेषितम्। पुटेत् त्रिधैवं यत्नेन भस्म स्यात् कज्जलप्रभम्।। (R.T.22/31)

Kamsya is mixed along with the equal quantity of Shuddha Manashila and Gandhaka and triturated with kumari swarasa. It is dried, confined in the sharava samputa and subjected to 3 Gajaputas which yield the Kamsya bhasma resembling the Kajal.

S.No	Drugs used	No. and Type of Puta	Reference
1	Shuddha Gandhaka and Haratala paste with Nimbu rasa- lepa over Kamsya patras	5 Ardha Gajaputa	R.R.S.5/210
2	Shuddha Manashila and Gandhaka; kumari swarasa bhavana	3 Gajaputa	R.T.22/31

Properties and Therapeutic Uses

कांस्यं लघु च तिक्तोष्णं लेखनं दृक्प्रसादनम्। कृमिकुष्ठहरं वातपित्तघ्नं दीपनं हितम्।। (R.R.S. 5/208)

Rasa	Tikta
Guna	Laghu
Veerya	Ushna
Doshaghnata	Vata Pitta Shamaka
Karma	Lekhana, Drusti prasadana, Deepana
Prayoga	Krimi, Kushta, Netrarogas

Dose

कांस्यकस्य प्रयोगस्तु रविलोहसमो मतः। गुञ्जार्द्धतश्च गुञ्जैकमिता मात्रा प्रयुज्यते।। (R.R.S. 22/34)

½ to 1 Ratti (62-125)

Anupana

Madhu, Rogahara Swarasa or Kwatha.

Important Formulations

1. Kshayakesari rasa
2. Lakshmi vilasa rasa
3. Makaradwaja vati
4. Chintamani rasa
5. Muktadya churna
6. Nityananda rasa
7. Vatavidhwasana rasa
8. Shadanana rasa

Pittala (Brass)

It is an alloy of Copper and Zinc.

Synonyms

पित्तलं पीतलोहञ्च कपिलोहञ्च रीतिका। आरं तथाऽऽरकूटञ्च तदेव परिकीर्तितम्।। (R.T.8/22-1)

Pittala	Peeta loha	Kapi loha	Reetika	Aram
Arakoota	Kalilauha	Kshudra swarnaka	Sita kanaka	Mishra
Pingala	Simhala	Peetalakam	Peetakam	Lohitakam
Pinga loha	Nishthiraka	Darukantaka	Rajareeti	Rangee
Rajaputree	Maheshwaree	Brahmanee	Brahmareeti	

Vernacular Names

Sanskrit - Pittala
English - Brass
Hindi - Peetal
Kannada - Hittale

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Minerological Identification

Brass is an alloy of copper and zinc; the proportions of zinc and copper can be varied to create a range of brasses with varying properties. Brass is a substitutional alloy. Brass has a muted yellow color, somewhat similar to gold.

Properties

Chemical composition	Cu_3Zn_2
Colour	Yellow to brassy yellow
Luster	Metallic
Crystal habit	Isometric
Cleavage	None
Specific Gravity	8.4-8.7
Diaphaneity	Opaque

Hardness (Moh's Scale)	3
Fracture	Irregular/Uneven
Streak	Golden yellow
Melting point	930°C
Boiling point	1100°C

Sources and Occurrence

It is an alloy of Copper and Zinc. Active producers are Drunen, Netherlands, which has the only active production facility which makes these high grade brass alloys.

It is prepared as below

Pittala nirmana (R.T.8/2-4): Two parts of shodhita Tamra and two parts of shodhita yashada are taken, melted in separate gara moosha (crucibles) and mixed together. The mixture is considered as Pittala (Brass), which is useful for Marana and then for therapeutic purposes.

Types

रीतिका काकतुण्डी च द्विविधं पित्तलं भवेत्। संताप्य काञ्जिके क्षिप्त्वा ताम्राभा रीतिका मता।। (R.R.S.5/191-192)

Pittala is of 2 types:

1. Reetika Pittala
2. Kakatundi Pittala

Tests employed to confirm the variety:

1. **Reetika Pittala** : When the sheets of Pittala are heated to red hot and dipped in kanji, the colour of the sheets appears like Tamra varna then it is reetika.
2. **Kakatundi Pittala** : When the sheets of Pittala are heated to red hot and dipped in kanji, if colour of the sheets appears like Krishna varna (black), then it is kakatundi.

Grahya Lakshana

गुर्वी मृद्वी च पीताभा साराङ्गी ताडनक्षमा। सुस्निग्धा मसृणाङ्गी च रीति रेतादृशी शुभा। (R.R.S.5/193)

The characteristics of genuine Pittala are:

1. **Guru** - Heavy.
2. **Mrudu** - Soft.
3. **Peetabha sarangi** - Yellow in colour.
4. **Tadanakshama** - Can resist to hammering (malleable and ductile).
5. **Snigdha** - Unctuous.
6. **Masruna** - Very smooth.

CHAPTER TEN

Agrahya Lakshana

पाण्डुपीता खरा रूक्षा बर्बरा ताडनाक्षमा। पूतिगन्धा तथा लघ्वी रीतिर्नेष्टा रमादिषु।। (R.R.S.5/194)

Pittala having the following characteristics is not recommended for Rasa karma or any other purposes:

1. Pandu peeta - Whitish yellow in colour.
2. Khara - Rough.
3. Rooksha - Dry.
4. Barbara - Unwholesome.
5. Tadana akshama - Cannot resist to hammering (brittle).
6. Pootigandha - Emitting foul smell.
7. Laghu - Light in weight.

Ashuddha, Apakwa and Avidhee Sevanajanya Dosha

Improperly processed/incinerated Pittala causes several disorders like:

1. Bhrama
2. Arshas
3. Bhagandara
4. Prameha
5. Jwara
6. Mrutyu

Shodhana

Samanya Shodhana of Pittala

'तैले तक्रे गवां मूत्रे ह्यारनाले कुलत्थजे। क्रमान्निषेचयेत्तप्तं द्रावे द्रावे तु सप्तधा।
स्वर्णादिलोहपत्राणां शुद्धिरेषा प्रशस्यते'।। (R.R.S 5/13)

Thin sheets of Pittala are taken and made into red hot and dipped in Tilataila, Takra, Gomutra, Aranala, Kulattha Kwatha for 7 times in each liquid media successively.

Reeti Pittala Vishesha Shodhana

तप्त्वा क्षिप्त्वा च निर्गुण्डी रसे श्यामारजोऽन्विते। पञ्चवारेण संशुद्धिं रीतिरायातिनिश्चितम्।। (R.R.S.5/197)

After purifying the brass with general methods it should further be heated strongly and quenched in Nirgundi rasa containing Haridra churna. Repeat the process for five times.

S.No.	Drugs used	Method of Shodhana	Reference
1	Nirgundi swarasa and Haridra churna	Nirvapa for 5 times	R.R.S.5/197

Marana

I Method

निम्बूरसशिलागन्धवेष्टिता पुटिताऽष्टधा। रीतिरायाति भस्मत्वं ततो योज्या यथायथम्।। (R.R.S.5/198)

A paste is prepared with the equal quantity of Shuddha Manashila and Shuddha Gandhaka with Nimbu rasa. This paste is applied on the Shuddha Pittala and subject

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to puta (½ gajaputa). By applying eight such putas, it will be converted into bhasma form.

ताम्रवन्मारणं तस्याः कृत्वा सर्वत्र योजयेत्। (R.R.S.5/199)

Marana of the Pittala can be done by the method mentioned for Tamra.

S.No	Drugs used	No. and Type of Puta	Reference
1	Shuddha Manashila and Shuddha Gandhaka with nimbu rasa- lepa	8 Ardha gajaputa	R.R.S.5/201

Properties and Therapeutic Uses

रीतिस्तिक्तरसा रूक्षा जन्तुघ्नी सान्नपित्तनुत्। कृमिकुष्ठहरा योगात्सोष्णवीर्या च शीतला।
काकतुण्डी गतस्नेहा तिक्तोष्णा कफपित्तनुत्। यकृत्प्लीहहरा शीतवीर्या च परिकीर्तिता।। (R.R.S.5/193-19)

Guna Karma	Reetika Pittala	Kakatundi Pittala
Rasa	Tikta	Tikta
Guna	Rooksha	Rooksha, Ushna
Veerya	Ushna/Sheeta depending upon its combination of dravyas	Sheeta
Doshaghnata	Pitta Raktahara	Kaphapittahara
Karma	Shodhana, Lekhana, Jantughna	Yakrut-pleehahara
Prayoga	Krimi, Kushta	Yakrut roga, pleeha roga

Dose

पित्तलस्य योगस्तु रविलोहसमो मतः। गुञ्जार्धतस्तु गुञ्जैकमिता मात्रा च युज्यते।। (R.T.22/18)

½ to 1 ratti (60 mg - 125 mg)

Anupana

Madhu, Navaneeta

Important Formulations

1. Pittala rasayana
2. Pittala druti
3. Meghanada Rasa
4. Shadanana rasa
5. Ratnaprabha vati
6. Ekadashayasa Rasa

Research Updates

1. Shri Mukund S A, **"Pharmaceutico- Analytical study of Pittala Bhasma"**- PG dissertation, Rajiv Gandhi University of Health Sciences (India)

The Raw Pittala taken for the study is Reetika Pittala as confirmed by AAS report. Among different Marana procedures of Pittala, Hingula & Haratala Maarita bhasma

is considered to be the best. As per XRD studies, Bhasma is in the form of Arsenic copper mercury Sulphide and Zinc Sulphide with Rhombohedral and Hexagonal crystal system.

Vartaloha

Preparation Method

कास्यं रीतिस्तथा ताम्रं नागो वङ्गश्च पञ्चमः। एकत्र द्राविते्रैतैः पञ्चलोहं प्रजायते।। (A.P.4/82)

Panchaloha is prepared by melting the 5 metals- Kamsya, Reeti, Tamra, Naga and Vanga taken all 5 metals together.

Synonyms

नामानि–

पञ्चलोहं पञ्चरसं वर्तुल भर्तमित्यपि। (A.P.4/83)

Vartaloha	Panchaloha	Pancharasa
Bharta	Vartula	

Vernacular Names

Sanskrit - Vartaloha
English - Five metal alloy
Hindi - Bharita
Kannada - Panchaloha

Shodhana

Vartaloha should subjected to samanya and Vishesha shodhana.

Samanya Shodhana

'तैले तक्रे गवां मूत्रे ह्यारनाले कुलत्थजे। क्रमान्निषेचयेत्तप्तं द्रावे द्रावे तु सप्तधा।
स्वर्णादिलोहपत्राणां शुद्धिरेषा प्रशस्यते'।। (R.R.S 5/13)

Vartaloha should be heated up to red hot on the flame and dipped into Tilataila, Takra Gomutra, Aranala, Kulattha Kwatha for 7 times in each liquid media successively.

Vishesha Shodhana

I Method

आदौ तैलादिके शोध्यं पश्चात्तप्त्वाऽजमूत्रके। निषिक्तं शुद्धिमायाति पञ्चलोहं न संशयः।। (A.P.4/54)

After samanya shodhana, Vartaloha should be subjected to vishesha shodhana. For this it should be heated and dipped in Ajamootra which will certainly purify the Panchaloha.

II Method

द्रुतमश्वजले क्षिप्तं वर्तलोहं विशुद्धयति। (R.R.S.5/215)

Vartaloha is heated to red hot and dipped in Ashwa mootra by which it becomes shuddha.

S.No.	Drugs used	Method of Shodhana	Reference
1	Ajamootra	Nirvapa	A.P.4/84
2	Ashwa mootra	Nirvapa	R.R.S.5/215

Marana

I Method

म्रियते गन्धतालाभ्यां पुटितं वर्तलोहकम्। (R.R.S.5/216)

अर्कक्षीरेण संपिष्टगन्धतालकलेपनात्। पञ्चकुम्भिपुटैर्मर्तं म्रियते योगवाहकम्।। (A.P.4/85)

Equal quantity of Shuddha Gandaka and Shuddha Haratala is mixed and made into paste by adding Arkaksheera. This paste is smeared over the Vartaloha and dried. After enclosing in the sharava samputa, it is subjected to 5 putas (Gajaputa).

S.No	Drugs used	No. and Type of Puta	Reference
1	Shuddha Gandaka, Shuddha Haratala and Arka ksheera lepa	5 putas (Gajaputa)	R.R.S.5/216 A.P.4/85

Properties and Therapeutic Uses

हिमाम्लं कटुकं रूक्षं कफपित्तविनाशनम्। रुच्यं त्वच्यं कृमिघ्नं च नेत्र्यं मलविशोधनम्।। (R.R.S.5/213-214)

Rasa	Katu
Guna	Rooksha
Veerya	Sheeta
Vipaka	Amla
Doshaghnata	Kapha Pitta Shamaka
Karma	Ruchivardhaka, Pachaka, Twachya, Krimighna, Netrya, Malashodhaka
Prayoga	Agnimandya, Twakrogas, Krimi, Netrarogas

Dose

½ - 1 Ratti (62-125 mg)

Anupana

Madhu

Manikya (Ruby)

Manikya (Ruby) is one among the Navaratnas which is red in colour.

Synonyms

माणिक्यं रङ्गमाणिक्यं पद्मरागसमाह्वयम्। रविरत्नं शोणरत्नं कुरुविन्दञ्च लोहितम्।। (R.T.2¾3)

Manikya	Rangamanikya	Padmaraga	Raviratna	Ratnarat
Shonaratna	Kuruvinda	Lohitam	Sougandhika	

Mineralogical Identification

The chemical composition of Ruby is Aluminum oxide (Al_2O_3), it also contains Iron, Chromium, Titanium oxide. Its colour is deep red due to presence of Iron and Chromium in small amount.

Chemical composition	Aluminum oxide, Al_2O_3
Colour	Deep red
Cleavage	None
Crystal system	Trigonal
Crystal habit	Terminated tabular hexagonal prisms
Specific Gravity	3.97-4.05
Transparency	Transparent to translucent
Hardness (Moh's Scale)	9.0
Luster	Subadamantine, vitreous, pearly
Fracture	Conchoidal, splintery
Streak	White
Melting point	2000°C
Boiling point	2980°C
Refractive Index	1.768-1.772
Dispersion	0.018

Sources and Occurrence

Rubies of the highest quality come from Burma (Myanmar). The Mogok Valley in Upper Myanmar (Burma) was for centuries the world's main source for rubies. These rubies form between layers of marble substrate. Other locations where rubies form in marble include the Himalayas and Vietnam.

Ruby also forms in the basalt that comprises the earth's crust. Sources for such rubies include Afghanistan, Pakistan and Sri Lanka. Basaltic rubies contain higher concentrations of iron, which deepens their colour.

Types

माणिक्यं पद्मरागाख्यं द्वितीयं नीलगन्धि च । (R.R.S.4/8)

Two types of Manikya are:

1. Padmaraga
2. Neelgandhi

कुशेशयदलच्छायं स्वच्छं स्निग्धं गुरूत्कटम्। वृत्तायतं समं गात्रं माणिक्यं श्रेष्ठमुच्यते।। (R.R.S.4/9)

The characteristics of Padmaraga Manikya are:

1. Kusheshaya dala chaya - Having the colour and complexion of lotus petals.
2. Swachcha - Clean.
3. Snigdha - Slimy appearance.
4. Mahat - Big.
5. Sphutam - Shining.
6. Vrittayata - Oval or cylindrical in shape.
7. Sama gatra - Even sized.

Manikya having the above qualities are said to be the best.

नीलं गङ्गाम्बुसंभूतं नीलगर्भारुणच्छवि। पूर्वं माणिक्यवच्छ्रेष्ठं माणिक्यं नीलगन्धि तत्।। (R.R.S.4/10)

The characteristics of Neelagandhi Manikya are:

1. Gangambu sambuta- available in the river Ganga.
2. Neelagarbharunachchavi-having red colour outside and blue colour within.
3. Except the colour, if other characteristics are same as the Padmaraga Manikya, then it is also considered as the best.

Based on the colour, Manikya is of 4 types:

1. Rakta (Red)
2. Peetabha (Yellowish)
3. Haritabha (Greenish)
4. Raktabha peeta (Reddish yellow)

Grahya Lakshanas

रक्तोत्पलदलच्छायं रम्यं दीप्तप्रभं परम्। वृत्तायतं समाङ्गञ्च माणिक्यं जात्यमुच्यते।। (R.T.2¾4)

Genuine Manikya should have the following characteristics:

1. Raktotpala dala chaya - Red colour resembling the colour of red lotus.
2. Ramya - Beautiful.
3. Deeptaprabha - Lustrous.
4. Vrittaayata - Oval shape.
5. Samanga - Even sized.

Agrahya Lakshanas

विच्छायं लघु धूमाभं विरूपं कर्कशं परम्। मलिनं चिपिटं वक्रं माणिक्यं त्याज्यमुच्यते।। (R.T.2¾5)

Manikya having the following characteristics are to be rejected:

1. Vichchaya	-	Lustre less	5. Karkasha	-	Rough
2. Laghu	-	Light	6. Malina	-	Dirty
3. Dhoomabha	-	Smoky appearance	7. Chipita	-	Flat surfaced body
4. Virupa	-	Disfigured			

Pareeksha

- It should emit red rays on coming in contact with the morning sun.
- When put in milk, it will make the milk look red.

Shodhana

निम्बूकस्वरसेनेह दोलायन्त्रे विधानतः।
यामैकं स्वेदितं कामं माणिक्यं शुद्धिमाप्नुयात्।। (R.T.2¾6)

Manikya is purified by subjecting it to swedana in Dola yantra using Nimbu swarasa for 1 yama (3 hours).

Marana

चूर्णीकृतं शोणरत्नं विमलैः समभागिकैः। पेषयेन्निम्बुकद्रावैर्बलिरोगशिलेङ्गुलैः।।
विमर्द्य सुदृढे खल्वे यत्नेन सप्तवासरम्। पुटयेद्वारणपुटे विशुष्कं कृतचक्रिकम्।।
रीत्यानयापि पुटितमष्टवारमसंशयम्। माणिक्यमचिरादेव मृतिमाप्नोत्यनुत्तमाम्।। (R.T.23/54-56)

Shuddha Manikya is mixed with the equal quantity of Vimala and triturated to make it a fine powder. This powder is mixed with equal quantity of Shuddha Gandhaka, Shuddha Manahshila and Shuddha Hingula and triturated again to form an homogenous mixture. This mixture is subjected to bhavana with Nimbu swarasa for 7 times. Then chakrikas are prepared, dried, confined to sharava samputa and subjected to Gajaputa. Such 8 Gajaputa will incinerate the Manikya undoubtedly.

General marana procedure told for all Ratnas excluding the Vajra can also be adopted to incinerate the Manikya.

लकुचद्राव सम्पिष्टैः शिलागन्धकतालकैः।
वज्रं विहान्यरत्नानि म्रियन्तेऽष्टपुटैः खलु।। (R.R.S. 4/63)

Shuddha Ratnas are made into powder and mixed with equal quantity of Shuddha Manashila, Shuddha Haratala and Shuddha Gandhaka and subjected to bhavana using Lakucha swarasa. Then chakrikas are prepared and subjected to Gajaputa. Such 8 Gajaputas will make the bhasma of all Ratnas except vajra.

Manikya Pishti

Shuddha Manikya is powdered and triturated with the rose water for 21 times or 3 days to make it a fine powder form. This is known as Manikya pishti. This is preserved in suitable air tight container and can be used therapeutically in conditions where Manikya bhasma is indicated.

Properties and Therapeutic Uses

माणिक्यं सुमृतं मेध्यं मधुरं तु रसायनम्। दीपनं वृष्यमायुष्यं वातपित्तहरं परम्।। (R.T.23/57)

Rasa	Madhura
Guna	Snigdha
Veerya	Sheeta
Doshaghnata	Vatakaphahara
Karma	Deepana, Vrushya, Ayushya, Rasayana, Medhya, Paaapa nashaka
Prayoga	Kshayaroga, Bhoota- preta badha, Karmaja vyadhi

Dose

आरभ्य गुञ्जापादांशात् गुञ्जार्द्धप्रमितं मृतम्। माणिक्यं योजयेद्धीमान् बलकालाद्यपेक्षया।। (R.T.23/59)

¼ - ½ Ratti (31-62 mg)

Anupana

Madhu, Navaneeta, Roganusara different preparations

Formulations

1. Javaharamohara Vati
2. Manikya mihirodaya Rasayana
3. Navaratna raja mriganka Rasa
4. Ratnabhagottara Rasa
5. Yakuti
6. Brahmi Vati
7. Mani Parpati

Research Updates

1. Sarita Rani, **Pharmaceutico Analytical study of Manikya Bhasma-** PG dissertation, Rajiv Gandhi University of Health Sciences (India)

Among different Marana procedures of Manikya, Manashila, Haratala and Gandhaka Marita Bhasma is considered to be the best. As per XRD studies Ashodhita Manikya and Shodhita Manikya is in the form of Aluminum oxide in Rhombohedral crystal structure, where as Manikya Bhasma showed Aluminum oxide in orthorhombic crystal structure. As the Aluminum oxide or corundum is a stable compound, hence there may be no change in compound after incineration. But processing may help in changing of crystal structure. Based on SEM-EDX study Ashodhita Manikya contains Al (23.395%). O (39.51%), Shodhita Manikya Al (38.02%), O (50.62%) and Manikya Bhasma Al (19.96%), O (44.185%), Reduction aluminum percentage in Manikya Bhasma compared to Shodhita Manikya may be due to incorporation of required elements from the pharmaceutical procedure followed. The mean particle size of Manikya Bhasma was 5.42 µm. so it can be said that Manikya Bhasma is having better dissolution rate.

Tarkshya (Emerald)

Synonyms

गारुत्मतं मरकतं तार्क्ष्यं गारुडसंज्ञकम्। बुधरत्नं रौहिणेयं हरिद्रत्नञ्च तन्मतम्।। (R.T.23/104)

Garutmat	Marakata	Tarkshya	Garuda	Budharatna
Rouhineya	Haridratna	Harinmani	Asmagarbhaja	Souparna

Mineralogical Identification

Emerald is the green gem variety of beryl ($Be_{32} + Al_{23} + Si_{64} + O_{18}$). The color of emerald is due to trace amounts of Cr and/or V replacing Al in the crystal structure. The presence of Cr and V in the beryl structure causes a red fluorescence that enhances the luminosity of the blue-green color.

Chemical composition	Aluminum silicate, $Be_2Al_2(SiO_3)_6$
Colour	Bluish green to green
Luster	Vitreous
Crystal system	Hexagonal
Crystal habit	Simple prismatic form
Cleavage	Parallel to the basal plane of the crystal
Specific Gravity	2.67 to 2.75
Diaphaneity	Transparent to translucent
Hardness (Moh's Scale)	7.5 to 8
Fracture	Conchoidal
Streak	White
Refractive Index	1.564-1.595
Dispersion	0.014
Melting point	1278°C
Boiling point	2468°C

Sources and Occurrence

Brazil currently accounts for approximately 10% of world emerald production. Emeralds have also been mined in Afghanistan, Australia, Austria, Bulgaria, China, India, Madagascar, Namibia, Nigeria, Pakistan, South Africa, Spain, Tanzania, the United States and Zimbabwe.

Types

Based on the colour, Tarkshya is of 3 types:

1. Harita - Best
2. Neela - Medium
3. Shweta - Average

Grahya Lakshanas

हरिद्वर्णं गुरु स्निग्धं स्फुरद्रश्मिचयं शुभम्। मसृणं भासुरं तार्क्ष्यं गात्रं सप्तगुणं स्मृतम्।। (R.R.S.4/20)

The seven characteristics of genuine Tarkshya are:

1. Harita varna - Green colour
2. Guru - Heavy
3. Snigdha - Unctuous
4. Sphuradrashmivat - Lustrous like sunrays
5. Masruna - Soft
6. Bhasurum - Shining
7. Gatra - Big

Agrahya Lakshanas

कपिलं कर्कशं नीलं पाण्डु कृष्णं मलान्वितम्। चिपिटं विकटं रूक्षं लघु तार्क्ष्यं न शस्यते।। (R.R.S.4/21)

The characteristics of Tarkshya which are not acceptable are:

1. Kapila - Reddish black colour
2. Karksha - Hard
3. Neela - Blue colour
4. Pandura - Yellowish white colour
5. Krishna - Black colour
6. Malanvita - Mixed with dirt
7. Chipita - Flat
8. Vikata - Crooked
9. Ruksham - Rough
10. Laghu - Light

Pareeksha

It will not change in its lustre even after rubbing or exposing to sunlight.

Shodhana

सुरभीपयसा यामं दोलायन्त्रे विधानतः। विपाचितं मरकतं विशुद्ध्यति सुनिश्चितम्।। (R.T.23/107)

Tarkshya is purified by subjecting it to swedana in Dolayantra using Godugdha for 1 yama (3 hours).

Marana

माणिक्यमारणोद्दिष्टविधिभ्यामतियत्नतः। अष्टधा पुटितं तार्क्ष्यं म्रियतेऽत्र न संशयः।। (R.T.23/108)

The procedure adopted for the marana of Manikya can be adopted for the bhasmikarana of Tarkshya. Subjecting Tarkshya to 8 putas will certainly incinerate the Tarkshya.

Tarkshya Pishti

Shuddha Tarkshya is powdered and triturated with the rose water for 3 days to make it a fine powder form. This is known as Tarkshya pishti. This is preserved in suitable air tight container for further therapeutical usage.

Properties and Therapeutic Uses

Rasa	Madhura
Guna	Sheeta
Veerya	Sheeta
Doshaghnata	Kaphapittahara
Karma	Ruchikaraka, Pushtikaraka, Ojovardhaka, Vishahara, Bhootabhadha Nashaka
Prayoga	Jwara, Chardi, Visha, Shwasa, Mandagni, Arshas, panduroga, Shosha, Amlapitta

Dose

आरभ्य गुञ्जापादांशाद् गुञ्जैकप्रमितं परम्। मृतं मरकतं युञ्जयात् बलकालाद्यपेक्षया।। (R.T.23/111)

¼th - 1 Ratti (31-125 mg)

Anupana

Madhu, Navaneeta

Formulations

1. Navaratna Raja Mrganka Rasa
2. Ratnabhagottara Rasa
3. Mani Parpati
4. Javaharmohara Vati

Pushparaga (Topaz)

Synonyms

पुष्पराजः पुष्परागः पीतरक्ताह्वयस्तथा। गुरुरत्नं पीतमणिः स एव गुरुवल्लभः।। (R.T.23/87)

Pushparaja	Pushparaga	Peetarakta	Gururatna	Peetamani
Guruvallabha	Peetashma	Manjumani	Vachaspati vallabha	

Mineralogical Identification

Sapphire is a variety of Corundum, an aluminum oxide mineral. Low iron content in Corundum is responsible for Yellow Sapphire's colour, sometimes called Golden Sapphire if intensely coloured.

Chemical composition	Aluminum oxide, Al_2O_3
Colour	Yellow
Luster	Vitreous
Crystal system	Trigonal
Crystal habit	Massive and granular
Cleavage	None
Specific Gravity	3.95 to 4.03

Diaphaneity	Transparent to nearly opaque
Hardness (Moh's Scale)	9.0
Fracture	Uneven, conchoidal
Streak	Colorless
Refractive index	1.762 to 1.788
Dispersion	0.018
Melting point	2040°C
Boiling point	2980°C

Sources and Occurrence

Sapphires are found in India, Brazil, Sri Lanka, Russia, Thailand, Australia, U.S.A, U.K., Nepal, Mexico, Zambia and Nigeria.

In India, Sapphires are found in Jammu. These are considered to be the best in the world. Few sapphires are also found in Orissa but they are not of very high quality.

Types

Based on colour, Pushparaga is of four types:

1. Shweta - White
2. Peeta - Yellow
3. Pandu - Yellowish white
4. Gulabi - Pink

According to Yuktikalpataru, it is of 2 types:

1. Padmaragavat
2. Marakatavat

Grahya Lakshanas

पुष्परागं गुरु स्निग्धं स्वच्छं स्थूलं समं मृदुः। कर्णिकार प्रसूनाभं मसृणं शुभमऽष्टधा।। (R.R.S.4/23)

Genuine Pushparaga should have the following characteristics:

1. Guru - Heavy
2. Snigdha - Unctuous
3. Swachcha - Clean
4. Sthula - Big
5. Samam - Even
6. Mrudu - Soft
7. Karnikara prasunabha - Colour resembling karnikar flower (yellow colour)
8. Masruna - Soft

Agrahya Lakshanas

निष्प्रभं कर्कशं रूक्षं पीतश्यामं नतोन्नतम्। कपिशं कपिलं पाण्डु पुष्परागं परित्यजेत्।। (R.R.S.4/24)

Pushparaga having the following characteristics should be rejected:

1. Nishprabham - Lustreless
2. Karkasha - Hard
3. Ruksha - Rough
4. Peetashyama - Yellowish black

5. Natonnata - Uneven
6. Kapisha - Brown coloured
7. Kapila - Reddish black colour
8. Pandu - Yellowish white colour

Shodhana

कुलत्थक्वथितोपेतैः काञ्जिकैः स्वेदितं समम्।
दोलायन्त्रे पुष्पराजं यामैकेन विशुद्ध्यति।। (R.T. 23/91)

Pushparaga is purified by subjecting it to swedana in Dolayantra for 1 yama (3 hours) using Kulatha kwatha mixed with Kanji.

Marana

माणिक्यमारणोद्दिष्टविधिभ्यामतियत्नतः। मारयेत्पुष्पराजन्तु रसतन्त्रविचक्षणः।। (R.T. 23/92)

For the marana of Pushparaga, the experts of Rasashastra can adopt the same procedure mentioned for the marana of Manikya.

General method of marana told for the Ratnas can also be adopted for the incineration of Pushparaga.

Pushparaga Pishti

Shuddha Pushparaga is grounded with gulab jala for three days, preserved and can be used for therapeutic purposes as Pushparaga pishti.

Properties and Therapeutic Uses

पुष्पराजन्तु शिशिरं दीपनं पाचनं परम्। कफवातप्रशमनं कुष्ठच्छर्दिनिबर्हणम्।। (R.T. 23/93)

Guna	Laghu, Sheeta
Veerya	Sheeta
Doshaghnata	Kaphavatanashaka
Karma	Deepana, Pachana, Vishghna, Dahaprashamana, Kushthaghna, Medhya, Bruhmana, Ayushyakara
Prayoga	Visha, Chardi, Daha, Raktapitta, Kushta, Gudaja Amaya

Dose

आरभ्यगुञ्जापादांशाद् गुञ्जैकप्रमितं परम्। सुमृतं पुष्पराजन्तु प्रयुञ्जीत भिषग्वरः।। (R.T. 23/95)

¼-1 Ratti (31-125 mg)

Formulations

1. Navaratna Raja Mrganka Rasa
2. Ratnabhagottara Rasa
3. Mani Parpati

Nilam (Sapphire)

Synonyms

नीलो नीलोपलो नीलं नीलरत्नं सुनीलकम्। महानीलश्च नीलाश्मशनिरत्नञ्च कीर्तितम्।। (R.T. 23/96)

Neela	Neelopala	Neelam	Neelaratnam
Suneelakam	Mahaneela	Neelashma	Shaniratna

Mineralogical Identification

Sapphire is a variety of the mineral corundum, consisting of Aluminum oxide (Al_2O_3) with traces amounts of elements such as Iron, Titanium, Chromium, Vanadium, or Magnesium. If both Titanium and Iron are present together, however, the result is a magnificent deep-blue colour. The process, known as charge transfer, produces the colour blue.

Chemical composition	Aluminum oxide, Al_2O_3
Colour	Typically blue, but varies
Luster	Vitreous
Crystal system	Trigonal
Crystal habit	Massive and granular
Cleavage	Poor
Specific Gravity	3.98-4.06
Diaphaneity	Transparent to nearly opaque
Hardness (Moh's Scale)	9.0
Fracture	Conchoidal, splintery
Streak	Colorless
Refractive Index	1.768-1.772
Dispersion	0.018
Melting point	2040°C
Boiling point	2980°C

Sources and Occurrence

Although sapphires are found in various parts of the world, not all regions produce the colours that are highly valued. For example, Australia is a dominant producer of sapphires, but these stones are considered less valuable due to their very dark colour. Fine quality sapphires are produced in Southeast Asia, with those from Sri Lanka often having the sought-after cornflower blue colour. Sapphires are found in India, Brazil, Sri Lanka, Russia, Thailand, Australia, U.S.A., U.K., Nepal, Mexico, Zambia, and Nigeria. In India, Sapphires are found in Jammu. These are considered to be the best in the world. Few sapphires are also found in Orissa but they are not of very high quality.

Types

जलनीलेन्द्रनीलञ्च शक्रनीलं तयोर्वरम्। (R.R.S. 4/49)

Two types of Neela are:

1. Jalaneela 2. Indraneela

श्वैत्यगर्भितनीलाभं लघु तज्जलनीलकम्। काष्ण्यर्गर्भितनीलाभं सभारं शक्रनीलकम्।। (R.R.S. 4/50)

- The one which is white internally and blue externally, which is laghu is called jalaneela.
- Indraneela has blue colour inside and black externally and it is guru.

Grahya Lakshanas

एकच्छायं गुरु स्निग्धं स्वच्छं पिण्डितविग्रहम्। मृदु मध्ये लसज्ज्योतिः सप्तधा नीलमुत्तमम्।। (R.R.S.4/51)

The characteristics of genuine Neela are:

1. Ekachchayam - Uniform or single colour through out.
2. Guru - Heavy.
3. Snigdha - Unctous.
4. Swachcha - Clean.
5. Pinditavigraham - Round shaped.
6. Mrudu - Soft.
7. Madhye lasajjyothihi - Intensive lustre at the centre.

Agrahya Lakshanas

रक्तार्द्धं विगतच्छायं रूक्षं लघु च कोमलम्। परिहेयं शौरिरत्नं मतं रत्नपरीक्षकैः।। (R.T. 23/98)

The characteristics of Neela which is not acceptable are:

1. Raktardham - Half part having red colour and other half having blue colour.
2. Vigatachchayam - Without complexion.
3. Rooksha - Rough.
4. Laghu - Light.
5. Komala - Soft.

Pareeksha

'अस्त्यानचन्द्रिकास्यन्दसुन्दरीक्षीरपूरितम्। यत्पात्रं रञ्जयत्याशु स जात्यो नील उच्यते'।। (A.P.5/125)

The fair and beautiful lady is made to hold the vessel containing milk in the moonlight on the full moon day and Neelamani is placed inside the milk. If the milk and the lady get coloured (blue colour), then the Neela mani is said to be the genuine and best.

Shodhana

नीलीस्वरससंयुक्तं दोलायन्त्रे विधानतः। यामैकं परिपक्वन्तु नीलं शुद्ध्यति निश्चतम्।। (R.T. 23/99)

CHAPTER TEN

Neela is purified by subjecting it to swedana in Dolayantra using Neeli swarasa for 1 yama (3 hours).

Marana

माणिक्यमारणोद्दिष्टविधिष्यामतियत्नतः। मारयेच्छनिरत्नं तु रसागमविशारदः॥ (R.T. 23/100)

Neela is incinerated by the methods told for the incineration of Manikya by subjecting it to the 8 putas.

Neela Pishti

Shuddha Neela is powdered and triturated with the rose water for 21 times or 3 days to make it a fine powder form. This is known as Neela pishti. This is preserved in suitable air tight container and can be used therapeutically in conditions where Neela bhasma is indicated.

Properties and Therapeutic Uses

श्वासकासहरं वृष्यं त्रिदोषघ्नं सुदीपनम्। विषमज्वरदुर्नामपापघ्नं नीलमीरितम्॥ (R.R.S.4/53)

Doshaghnata	Tridoshahara
Karma	Medhya, Buddhiprada, Ayushya, Deepaka, Balavardhaka, Varnya, Twachchya, Vrishya, Papanashaka
Prayoga	Pitta pradhana vyadhis, Raktapitta, Gulma, Swasa, Kasa, Vishama-jwara, Gudarogas, Kushta

Dose

$\frac{1}{8}^{th}$ to ½ ratti (15-62 mg)

Anupana

Madhu, Navaneeta, Roganusara different preparations

Formulations

1. Mani Parpati
2. Ratnabhagottara Rasa
3. Rajamruganka Rasa

Gomeda (Zircon or Cinnamone Stone)

गोमेदः समरागत्वाद्गोमेदं रत्नमुच्यते। (R.R.S.4/53)

It is termed as Gomedha because of its colour of the fat of the cow.

Synonyms

गोमेदकश्च गोमेदः पिङ्गस्फटिक इत्यपि। गोमेदं राहुरत्नञ्च कीर्तितश्च तमोमणिः॥ (R.T. 23/120)

Gomedaka	Gomeda	Pingasphatika	Rahuratna	Tamomani

Mineralogical Identification

Zircon is a mineral belonging to the group of nesosilicates, and it is a source of the metal zirconium. Its chemical name is zirconium silicate.

Chemical composition	$ZrSiO_4$
Colour	Usually yellow, brown, or red. Also colorless, gray, blue, and green.
Cleavage	Imperfect
Crystal system	Tetragonal
Crystal habit	Microscopic crystals
Specific Gravity	4.68
Transparency	Translucent to transparent
Hardness (Moh's Scale)	7.5
Luster	Vitreous to adamantine, sometimes oily
Fracture	Conchoidal to uneven
Streak	Colorless. Usually harder than the streak plate
Melting point	1855 °C
Boiling point	4371 °C
Refractive Index	1.920-1.960
Dispersion	High, 0.039

Sources and Occurrence

Zircon persists in sedimentary deposits due to its hardness, sturdiness and chemical inertness and is a not unusual constituent of most sands. It is an unusually common and widely distributed mineral, but fine crystals are rare.

It is available in Norway, Germany, Russia, USA, New York, New Jersey; near Green River, Canada, in the Matura and Saragam districts, Sri Lanka and Australia. In India, it is found in Bihar, Uttar Pradesh, Kerala and Tamil Nadu.

Types

Based on colour, Gomeda is of 4 types:

1. Shwetabha peeta - Brahmana
2. Raktabha peeta - Kshatriya
3. Peeta - Vaishya
4. Krishnabha peeta - Shudra

Grahya Lakshanas

सुस्वच्छगोजलच्छायं स्वच्छं स्निग्धं समं गुरु। निर्दलं मसृणं दीप्तं गोमेदं शुभमष्टधा।। (R.R.S. 4/54)

The characteristics of genuine Gomeda are:

1. Suswachcha Gojalachaya - Clean cow's urine colour.
2. Swachcha - Clean and clear.
3. Snigdha - Unctuous.
4. Samam - Equilateral.

5. Guru - Heavy.
6. Nirdala - Without layers.
7. Masrina - Soft.
8. Deepta - Shining.

Agrahya Lakshanas

विच्छायं लघु रूक्षाङ्गं चिपिटं पटलान्वितम्। निष्प्रभं पीतकाचाभं गोमेदं न शुभावहम्।। (R.R.S.4/55)

The characteristics of Gomeda which is not acceptable are:

1. Vischaya - Lustureless
2. Laghu - Light
3. Rookshanga - Having rough parts
4. Chipita - Flat
5. Patalavinta - With layers
6. Nishprabham - Without brightness
7. Peetakachabham - Appears like a yellow glass

Shodhana

निम्बूकस्वरसेनेह दोलायन्त्रे वियानतः। परिस्विन्नं तु यामैकं शुद्धिमायात्यनुत्तमाम्।। (R.T.23/123)

Gomeda is purified by subjecting it to swedana in Dolayantra using Nimbu swarasa for 1 yama (3 hours).

Marana

माणिक्यमारणोद्दिष्टविधिभ्यामतियत्नतः। त्वष्टवारं सुपुटितं गोमेदं मृतिमाप्नुयात्।। (R.T.23/124)

Gomeda is incinerated by the methods told for the incineration of Manikya by subjecting it to the 8 putas.

Gomeda Pishti

Shuddha Gomeda is powdered and triturated with the rose water for 21 times or 3 days to make it a fine powder form. This is known as Gomeda pishti. This is preserved in suitable air tight container and can be used therapeutically in conditions where Gomeda bhasma is indicated.

Properties and Therapeutic Uses

गोमेदं कफपित्तघ्नं क्षयपाण्डुक्षयकरम्। दीपनं पाचनं रुच्यं त्वच्यं बुद्धिप्रबोधनम्।। (R.R.S.4/56)

Rasa	Amla
Guna	Ushna
Veerya	Ushna
Doshaghnata	Kaphapittaghna
Karma	Deepana, Pachana, Ruchivardhaka, Budhiprabodha, Twachya, Smrutivardhaka, Papanashaka
Prayoga	Kshaya, Panduroga

Dose

आरभ्य गुञ्जापादांशाद्गुञ्जैकप्रमितं मृतम्। गोमेदं तु प्रयुञ्जीन बलकालाद्यपेक्षया।। (R.T.23/127)

¼th - ½ ratti (31- 62 mg)

Anupana

Madhu, Navaneeta, Roganusara different preparations.

Formulations

1. Navaratna Raja Mrganka Rasa
2. Ratnabhagottara Rasa

Vaidura (Cats Eye)

Synonyms

विदूररत्नं वैदूर्यं केतुरत्नं विदूरजम्। बिड़ालाख्यं बिडालाक्षं वायजञ्च प्रकीर्तितम्।। (R.T.23/112)

Viduraratna	Vaidurya	Keturatna	Viduraja	Bidalakya
Bidalaksha	Vayaja	Marjaranetra	Pravrushya	

Mineralogical Identification

Translucent yellowish chatoyant chrysoberyl is called cymophane or cat's eye. Cat's Eye describes a gemstone polished into a cabochon that displays a narrow band of concentrated light going across the width of the stone. This effect, known as chatoyancy, or cat's eye effect, is caused by inclusions of fine, slender parallel mineral fibers in the gemstone that reflect light in a single band. Chrysoberyl has the strongest and most distinct cat's eye effect of all gemstones.

Chemical composition	$BeAl_2O_4$ (Aluminate of beryllium)
Colour	Colorless, yellow, pale sheen
Luster	Vitreous
Crystal system	Orthorhombic
Crystal habit	Tabular or short prismatic, prominently striated
Cleavage	Perfect
Specific Gravity	3.5-3.84
Diaphaneity	Transparent to translucent
Hardness (Moh's Scale)	8.5
Fracture	Conchoidal to uneven
Streak	White
Refractive Index	1.744 -1.755
Dispersion	Low, 0.014

Melting point	1,287 °C
Boiling point	2,471 °C

Sources and Occurrence

It is available in many places of Brazil, Russia, near Masvingo (Ft. Victoria), Zimbabwe. Abundant in gem gravel placers found in the Ratnapura district, Sri Lanka. Also found in the USA, Paris and Norway.

Types

Based on the colour, vaidurya is of 4 types:-

1. Shweta (white)
2. Dhoomra (smoky)
3. Krishnabha (blackish)
4. Mishrita (mixture of colours)

According to modern mineralogy, the three main varieties of chrysoberyl are:-

1. Ordinary yellow-to-green chrysoberyl
2. Cat's eye or cymophane, and
3. Alexandrite.

Grahya Lakshanas

वैदूर्यं श्यामशुभ्राभं समं स्वच्छं गुरू स्फुटम्। अभ्रशुभ्रोत्तरीयेण गर्भितं शुभमीरितम्।। (R.R.S.4/57)

Genuine Vaidurya should have the following characteristics:-

1. Shyama Shubrabha - Blackish white in colour.
2. Samam - Equilateral.
3. Swachcham - Clean.
4. Guru - Heavy.
5. Sputam Abhram - Lustrous like Abhraka.
6. Shubrottariyena garbha - Has white stripes inside.

Agrahya Lakshanas

श्यामं तोयसमच्छायं चिपिटं लघुकर्कशम्। रक्तगर्भोत्तरीयं च वैदूर्यं नैव शस्यते।। (R.R.S.4/58)

Vaidurya having the following characteristics are to be rejected:-

1. Shyama - Blackish colour.
2. Toya samachchayam - Watery colour (without lustre).
3. Chipita - Flat.
4. Laghu - Light.
5. Karkasha - Rough.
6. Raktagarbhottriya - Has red coloured lines inside.

Shodhana

त्रिफलाक्वथितोपेतं वैदूर्यं यममात्रकम्।
दोलयन्त्रे परिस्विन्नं शुद्धिमायात्यनुत्तमाम्।। (R.T.23/115)

Vaidurya is purified by subjecting it to swedana in Dolayantra using Triphala qwatha for 1 yama (3 hours).

Marana

माणिक्यमारणोद्दिष्टविधिभ्यामतियत्नतः। विदूररत्नं पुटितं त्वष्टधा मृतिमाप्नुयात्।। (R.T.23/116)

Vaidurya is incinerated by the methods told for the incineration of Manikya by subjecting it to the 8 putas.

Vaidurya Pishti

Shuddha Vaidurya is powdered and triturated with the rose water for 21 times or 3 days to make it a fine powder form. This is known as Vaidurya pishti. This is preserved in suitable air tight container and can be used therapeutically in conditions where Vaidurya bhasma is indicated.

Properties and Therapeutic Uses

वैदूर्यं रक्तपित्तघ्नं प्रज्ञायुर्बलवर्धनम्। पित्तप्रधनरोगघ्नं दीपनं मलमोचनम्।। (R.R.S.4/59)

Rasa	Madhura
Guna	Sheeta
Veerya	Sheeta
Doshaghnata	Tridoshahara
Karma	Pragna-ayur-balavardhnam, Medhya, Deepana, Chakshushyam, Malabhednam, Santatikara
Prayoga	Raktpitta, Gulma, Pitta pradhana rogas

Dose

¼th- 1 ratti (31-125 mg)

Anupana

Madhu. Navaneeta, Roganusara different preparations.

Formulations

1. Ratnabhagottara Rasa
2. Pindanjana
3. Churnajana
4. Indrokta Rasayana
5. Navaratnaraja Mrganka Rasa

Mriga Shringa (Stag Horn)

Mriga Shringa is the antler of a deer which keeps shedding during mating season.

Anthers are extension of an animal's skull found in members of deer family. Anthers are shed and re grown each year. Primary function is sexual attraction and as weapon in fights between male deers for control of harems.

Synonyms

मृगशृंगं त्वेणशृङ्गं तथा मृगविषाणकम्।
हरिणशृङ्गकञ्चैव समाख्यातं भिषग्वरैः॥ (R.T.12/103)

Mrigashringa	Enashringa	Mrigavishankha	Harinashringa	Vishana
Shringa	Shringaka			

Vernacular Names

Sanskrit - Mrigashringa
English - Deerhorns, Hart's horn
Hindi - Hiran singh
Kannada - Jinke kombu

Mineralogical Identification

Mriga Shringa is of animal origin. The horn is removed from the animal called stag deer, a species belonging to harina jaati. The horn of stag deer is usually tribranched, curved upwards, dark brown is pale yellow in colour marked with longitudinal ribs which are tuberculated. On cross section inner most portion will be hard surrounded by porous porth. Marginally it is very compact. When freshly cut it smells like burnt sugar. Mrigashringa is chiefly composed of calcium and phosphorous along with other organic elements.

Chemical composition	$Ca_3(PO_4)_2$
Appearance	Dull white
Hardness	Incredibly tough
Solubility	Water soluble, alcohol insoluble
pH	10
Specific Gravity	0.7767

Sources and Occurrence

It is a Jangama dravya. It is a Horn of deer, collected from deer, especially from antilopes. A stag deer formerly inhabited the plains region of the western United States in winter and open, forested areas in summer. Deer that live in mild or cold climates shed their antlers each winter and begin to grow a new set in spring.

Grahya Lakshanas

कीट नुपहतं दीर्घं भाराढ्य सुदृढं तथा।

अनेकशृङ्गसंयुक्तं मृगशृंग वरं मतम्।। (R.T.12/104)

The Mrigashringa having the following characteristics are said to be the superior:

1. Keetanupahatam - Free from infestation from pests and other things.
2. Deergha - Long.
3. Bharadya - Heavy.
4. Sadruda - Strong and sturdy.
5. Anekashringa samyukta - Having many branches.

Shodhana

Classical reference of its shodhana is not available but according to Dr. Siddhi nanadan Mishra, it should be boiled in Swarasa or kwatha of amla dravyas for 3 hours to purify the Mrigashringa.

Marana

मृगशृङ्गं समादाय करपत्रेण कर्तयेत्। खण्डशः कारयित्वा च त्वङ्गाराग्नौ दहेत्ततः।।
सुदुग्धञ्चाथ विज्ञाय खल्वे सञ्चूर्णयेद्भिषक्। रविदुग्धेन सम्पेष्य चक्रिकाः कारयेत्ततः।।
शरावसम्पुटान्तःस्थं पुटेतीव्राग्निना भिषक्। त्रिवारं पुटनादेणविषाणं मृतिमाप्नुयात।। (R.T.12/105-107)

The Mrigashringa is cleaned and cut into small pieces. These pieces are placed over the burning charcoal. After burning completely, the pieces are taken into khalva yantra, triturated well to make it a fine powder. Later it is subjected to bhavana with Arka dugda and chakrikas are prepared. These chakrikas are enclosed in sharava samputa and subjected to gajaputa. This procedure is repeated for 3 times to obtain mriga shringa bhasma.

CHAPTER TEN

Properties and Therapeutic Uses

Rasa	Neerasa
Guna	Laghu, snigda
Veerya	Ushna
Doshaghnata	Kapha Vatahara
Karma	Kapha nissaraka, Balya, Jwaraghna, Kantivardhana, Kasa shwasahara, Hridya
Prayoga	Hruchchoola, Parshwa shoola, Kasa, Shwasa, Pratisyaya, Shirashoola

Dose

1-2 ratti (125 mg to 250 mg)

Anupana

Go ghrtha, Gudugdha, Navaneeta, Madhu, Ardraka swarasa.

Formulations

1. Trinetra Rasa
2. Grahani Vajrakapata Rasa
3. Jwarankusha Rasa
4. Jaharmohar Vati
5. Yaavanaratneshwara Rasa
6. Balarka Rasa
7. Sarveshwara Rasa
8. Kandarpasundara Rasa
9. Hridya Churna
10. Trigunakhya Rasa

Sikata (Silica)

It is commonly known as Valuka/Baluka. It is used in valukayantra as a media.

Synonyms

Sikata	Sikta	Baluka	Baloo	Retha
Rethi	Rethaja	Rega	Beloo	Ramala
Sainda	Sharkara	Pravahajanitha	Paneeyachurnaka	Sukshma

Vernacular Names

Sanskrit : Sikata, Valuka
English : Sand
Hindi : Balu
Latin : Silica
Kannada : Maralu

Mineralogical Identification

Sand is a naturally occurring granular material composed of finely divided rock and mineral particles. The most common constituent of sand, is silica (silicon dioxide), usually in the form of quartz. Colour differs in the sand depend upon contamination of some other metals and minerals into it. Some sands contain magnetite, chlorite, glauconite or gypsum.

Chemical composition	SiO_2
Colour	Iron-black, dark silver-gray to bluish brown
Cleavage	Absent
Crystal system	Isometric
Crystal habit	Limited to microscopic crystals and inclusions
Specific gravity	2.3
Transparency	Opaque

Hardness (Moh's Scale)	6-7
Luster	Metallic
Fracture	Conchoidal
Streak	Black
Melting point	1710°C
Boiling point	2230°C

Sources and Occurrence

Rocks erode or weather over a long period of time, mainly by water and wind, and their sediments are transported down stream. These sediments continue to break apart into smaller pieces until they become fine grains of sand. Sand dunes are a consequence of dry conditions or wind deposition. The Deserts are known for its vast sand dunes, which exist mainly due to a lack of vegetation and water. Marine sand (or ocean sand) comes from sediments transported into the ocean and the erosion of ocean rocks. Europe is the main miners of marine sand.

Properties and Therapeutic Uses

Rasa	Madhura
Guna	Sheeta
Veerya	Sheeta
Doshaghnata	Vatahara
Karma	Santhapanashaka, Sramanashaka, Lekhani, Vranagna
Prayoga	Raktasteevana, Urakshata

Dose:

3-6 Masha (3-6 grams).

Anupana

Milk.

Formulations

Sikatavalehya (Ref: Rasamritam).

Vyomashma (Sangeyashab - Jade)

Jade refers to an ornamental mineral, mostly known for its green varieties. This drug is mentioned in Ayurvedic classics in Sikatavarga, also it is considered under uparatna.

References are also available in Unani texts.

Synonyms

Vyomashma	Sange Yashaba	Bhima Pashana
Yashavashila	Harinmani	Haritashma

Vernacular Names

Sanskrit : Vyomashma
English : Jade
Hindi : Sange Yashab, Houladil patthar

Mineralogical Identification

Jade can refer to either of two different minerals- nephrite, a silicate of calcium and magnesium, or jadeite, a silicate of sodium and aluminum. The higher the iron content, the greener the colour.

The most priced variety is imperial jade in rich emerald green due to chromium.

Chemical composition	Na (Al, Fe)Si_2O_6
Colour	Virtually all colors, mostly green
Cleavage	None
Crystal system	Monoclinic
Crystal habit	Intergrown grainy or fine fibrous aggregate
Specific gravity	2.9-3.38
Transparency	Translucent, opaque
Hardness (Moh's Scale)	6-7
Luster	Greasy to pearly
Fracture	Splintery
Streak	White
Melting point	1040°C
Refractive Index	1.66-1.68
Dispersion	None

Sources and Occurrence

Jade is found in metamorphic rocks and as alluvial pebbles and boulders. Jade is mined in many locations around the world. Both jadeite and nephrite are found in Russia, China, Guatemala, Japan and California (USA). Nephrite deposits of varying quality have been discovered in both the Swiss Alps and New Zealand. Approximately 70% of the world's gem quality jadeite, one of the minerals that are commonly referred to as jade, comes from Myanmar. In India, it is found in

Kashmir and Ladakh.

Shodhana

Shodhana of Vyomashma is done by nirvapa method by heating and immersing 21 times in the liquids like Arjuna Kwatha, Gulab jala or Gojihwa arka.

Marana

Purified Vyomashma is triturated with Arjuna kwatha or Rose water or Kumari Swarasa, then Chakrikas are prepared and dried. Dried chakrikas are sealed in sharava samputa and subjected to 10 to 12 Gajaputa to get Vyomashma bhasma.

Pishti

Shuddha Vyomashma is powdered and triturated with the Gulab or Chandana jala for 4-5 days to make it a fine powder form. This is preserved in suitable air tight container and can be used therapeutically in conditions where Vyomashma bhasma is indicated.

Properties and Therapeutic Uses

Guna	Rooksha, Sheeta
Veerya	Sheeta
Karma	Hridya, Balya, Deepana, Medhya
Prayoga	Hriddourbalya, Raktachchapa, Nidralpata, Antrikavrana, Amashayashoola, Pravahika, Mootradaha, Ashmari

Dose

2-4 Ratti (250-500 mg).

Anupana

Madhu, Navaneeta, Sita, Arjunatvak kwatha, Ark Gulab (Rose water).

Formulations

1. Brahmi Vati
2. Hrudvepanari Churna
3. Vyomashma Pishti
4. Jaharmohar Vati

Kousheyashma (Asbestos)

Kousheyashma is a mineral drug, which looks like a stone made of compressed fibers. A number of minerals belonging to the Amphibole group exhibit the properties of Kousheyashma. Hence it may be considered as Asbestos. It is a soft stone having yellowish or reddish white colour just like the threads of silk. It is a bad conductor of heat, hence may be used for protection from fire, in form of clothes.

Vernacular Names

Sanskrit - Kousheyashma
English - Asbestos
Hindi - Resmi patthar
Persian - Sange resham
Kannada - Kalnaru

Mineralogical Identification

Asbestos is a naturally occurring silicate mineral with long, thin fibrous crystals. It is a compound of Calcium magnesium silicate.

Chemical composition	$Mg_3Si_2O_5(OH)_4$
Colour	Green, red, yellow, white, gray, blue
Cleavage	Prismatic
Crystal system	Orthorhombic, monoclinic
Crystal habit	Amorphous, granular, massive
Specificgravity	2.4-3.3
Transparency	Translucent to Opaque
Hardness (Moh's Scale)	2.5-6.0
Luster	Silky
Fracture	Fibrous
Streak	White
Melting point	400 to 1,040°C
Refractive Index	1.53-1.72
Dispersion	Relatively weak

Sources and Occurrence

China is one of the world's largest producers of Asbestos, followed by Russia. Large deposits are found in the Ural Mountains in the Russian Federation, in the Appalachian Mountains in the USA, and in Canada. India's asbestos requirement is met through imports from Russia, Kazakhistan, Brazil and China. In India, the resources are found in Rajasthan, Karnataka, Jharkhand, Andhra Pradesh, Odisha and Uttarakhand.

Asbestos is known to have toxicity. Inhalation of toxic Asbestos fibres can cause serious illnesses, including malignant mesothelioma, lung cancer and asbestosis.

Shodhana

Specific shodhana method of Kausheyashma are not mentioned in Ayurveda classics, but can be done as similar to that of Mukta.

Marana

Kausheyashma is triturated with Kumari swarasa and enclosed in Sharava samputa. Later it is subjected to 4-8 Gaja puta till the proper bhasma is formed. The obtained bhasma will be white in colour.

Pishti

Kausheyashma is powdered and triturated with rose water, for 3-4 days to make it a fine powder form. This is preserved in suitable air tight container and can be used therapeutically in conditions where Kausheyashma bhasma is indicated.

Properties and Therapeutic Uses

Guna	Sheeta
Veerya	Sheeta
Doshaghnata	Pittahara
Karma	Rakta pitta nashaka, Rakta sthambaka, Balya, Varnya
Prayoga	Raktodgama, Puyodgama, Prameha, Raktapitta, Jwara, Kasa, Shwasa, Pradararogas, Dantarogas, Danta shaithilya, Dhantapuya

Dose

2-4 ratti (250-500 mg).

Anupana

Milk and Water.

Formulations

1. Kachuradi Churna
2. Shirastoda Gulika
3. Marma Gulika
4. Balashoolari Churna
5. Vayu Gulika
6. Kasturyadi Gulika
7. Jalamanjari
8. Kshaya Kulantaka Chendooram
9. Kalnar Parpam
10. Amirtha Gandhi Kukkil Valathy

Badarshama (Silicate of Lime)

Badarshma is a round or oval-shaped, grey coloured, fruit- like rocky fossil that originates from stone. It is named as its shape resembles the Badara (Jujube) fruit. The stone is tapering on both ends, grey in colour, with lines on its surface.

Sources and Occurrence

It is available in Arabian countries, Egypt, Mecca, Madina and Syria. It is imported from Arab countries to India and commonly used by Unani physicians.

Synonyms

Ashmabhid	Badrashma	Badaripashana	Pashanabadara

Vernacular Names

Sanskrit : Badarashma, Ashmabhid,
English : Fossile Norinite, Fossile Encrinite, Silicate of lime
Arabi : Hajrulyahud, Hajrujjaitun
Pharsi : Sangejahudan, Sangeyahud
Unani : Yahuda, Hajaratbera
Hindi : Berapatthar, Hajarathber, Hajarath Jahoor, Pattharver

Mineralogical Identification

Chemically Silicate of lime is composed of lime and silica. This has rough surface with longitudinal striations.

Chemical composition	Si_4CaO_4
Colour	White, colorless or gray
Cleavage	Perfect in two directions at near 90°
Crystal system	Triclinic, Monoclinic
Crystal habit	Tabular crystals-commonly massive in lamellar, radiating, compact and fibrous aggregates
Specific Gravity	2.86-3.09
Transparency	Transparent to translucent
Hardness (Moh's Scale)	4.5 to 5.0
Luster	Vitreous or dull to pearly on cleavage surfaces
Fracture	Splintery to uneven
Streak	White
Melting point	1540°C
Refractive Index	1.616-1.640

Shodhana

Badarashma is heated to red hot and then dipped in Moolika swarasa (Radish juice) for seven times. This will purify the Badarashma.

Marana

Shuddha Badarashma is triturated with Kumari swarasa and chakrikas are prepared. These chakrikas are enclosed in sharava samputa and then subjected to Gaja puta till the bhasma siddhi lakshana appears. Generally 7 such putas will make the Badarshma bhasma.

Pishti

Shuddha Badarashma is powdered and triturated with the Gulab or Chandana jala for 3-4 days to make it a fine powder form. It can also be prepared by grinding it with kadali stambha (plantain stem) juice or Moolika (Radish juice) for seven days. This is preserved in suitable air tight container and can be used therapeutically in conditions where Badarashma bhasma is indicated.

Properties and Therapeutic Uses

Doshaghnata	Pitta shamaka
Karma	Mutrala, Ashmaribhanjaka, Hrithshulahara, Vamananashaka
Prayoga	Mutrakrucchra, Mutraghata, Mutralpata, Mutrasmari, Mutradaha, Upadamsha

Dose

4-8 ratti (500 mg - 1 gm).

Anupana

Kadalikanda rasa, water or milk or rose water or sandal wood water is used as adjuvant.

Formulations

Ela panchaka churna.

Discussion

Rasashastra is the science which includes drugs belonging to Sthavara, Jangama and Audbhida which are used for the management of diseases. These drugs are classified under different groups of rasadravya. In each group of dravyas there are some controversial drugs or drugs which are not much used now a days. The word controversy refers to the confusion or unauthentic or unjustified versions about the drugs. Rasashastra is older science and evolved many centuries back and as the time advances, some drugs which were available before might not available with present available sources. Some of the drugs are rarely found in their native form like Giri Sindhura. The drugs that are explained by RasAcharyas regarding their properties and grahyagrahya lakshanas are cannot be assessed completely in present mineral drugs like Chapala. It is because of non-availability or scarcity of native forms of mineral or ore-mineral. Even with clear identification, many of the Ratnas are also not used much

in therapeutics because of their costly nature. Different scholars interpreted some of the drugs and their properties differently like kankushta. That created much confusion with respect to use of that drug.

On considering the development of Rasashastra over a period of hundreds of year, it can be seen that many drugs proved to be of little use, while many are not available. In present days, due to scarcity, unavailability, mis interpretations of the drug many of the drugs are not in use and some of them are used rarely. Due to these reasons, recent authors even omitted these drugs and not described in their texts. These drugs are categorised here under 'Nice to know drugs'. As we found description of these drugs in ancient Rasa texts, it would be nice if we know about these drugs, so these descriptions are dealt in this chapter.

Conclusion

Rasa dravyas, which are not used much nowadays or the drugs which are not having clear cut identification or correlation with the modern minerals available in present days are having less importance. Still, as they have mentioned in rasa literature, knowledge of these drugs can be obtained.

Extended Learning

- Research updates of Rasadravyas.

MODEL QUESTIONS

Short Answers

- Briefly describe the properties, dose, anupana and therapeutic uses and ashuddha, apakwa and avidhee sevanajanya dosha and its management of Vaikrantha
- Write a short note on Mriddara Shringa.
- Anjana Prabheda and Controversy of Rasanjana.
- Name controversial drugs in Rasashastra and explain controversies of Vanhijara
- What are Ratnas? Explain Manikya in detail.
- Write the method of Shodhana, Marana and Pishti of Badarashma.
- Describe the sources and occurrence and mineralogical identification of Kousheyasma
- Describe the types and Grahya-agrahya lakshanas of vaidurya
- Write the shodha, Marana and Pareeksha vidhi of Nilama

CHAPTER 11

KALPANA NIRMANA – III

(METHOD OF PREPARATION OF DIFFERENT DOSAGE FORMS)

PAPER 1

Contents

- **Sharkara Kalpana:** General method of preparation, difference between sharkara kalpana and syrup, importance of temperature, precautions, confirmatory tests, packing, preservation, shelf life with Example of Tulasi Arka Sharkara and Nimbu sarkara
- **Gudapaka:** General Method of Preparation, Siddhilakshana, precautions, packing, preservation, shelf life with Example of Manibhadra Guda, Guda Pippali
- **Lavana Kalpana:** General Method of Preparation, importance of temperature, precautions, confirmatory tests, packing, preservation, shelf life with Example of Narikela Lavana, Arka lavana
- **Kshara Kalpana:** General Method of Preparation, Kshara sutra preparation, precautions, packing, preservation, shelf life with Example of Kadali Kshara, chincha Kshara
- **Ayskriti Kalpana:** General Method of Preparation, shelf life with Example Ayaskriti, lauha rasayana
- **Lepa Kalpana:** General Method of Preparation, importance of temperature, precautions, confirmatory tests, packing, preservation, shelf life with Example of Avalgunjadi Lepa, Keshavardhaka Lepa, Dashanga lepa, Shatadhoutha and Saharsadhoutha Ghruta.

Learning Outcome

At the end of this chapter, Students can able to

1. Describe sharkara kalpana along with preparation method of Syrup along with its shelf life.
2. Describe Gudapaka preparation method with its confirmatory tests and precautions along with its shelf life.
3. Describe Lavana kalpana preparation method with its confirmatory tests and precautions. Explain therapeutic importance of prepared Lavana kalpana along with its shelf life and packaging techniques
4. Describe Kshara kalpana preparation method with its shelf life and precautions.
5. Describe Ayaskriti kalpana preparation method.
6. Describe Lepa kalpana preparation method with its confirmatory tests and precautions along with its shelf life and packaging techniques

Sharkara Kalpana

Introduction

Even though Sharkara is mentioned in the classical textbooks it refers to a type

of Madya. Here it refers to the pharmaceutical preparation Syrup. This is a sweet and viscous more palatable liquid dosage form. The pharmaceutical preparation was first mentioned by Yadavji Trikamji Acharya in Dravyaguna Vijnana, Paribhasha.

Definition:

हिमे फाण्टें शृते अर्के वा शर्करा द्विगुणां क्षिपेत्। मन्देऽग्नौ साधितं पूतं पटात् तत् शर्करं स्मृता।।

(Dra. Vi by Yadavji)

To 1 part of any of the liquids like Hima, Phanta, Kashaya, or Arka, 2 parts of Sugar is added and boiled over the mild fire until it attains the Syrup consistency (one thread consistency). Later it has to be filtered and preserved in air tight container.

Syrup

The syrup is a concentrated solution of sugar in water or other aqueous solutions. The sugar concentration in syrup is 66% w/w.

Difference Between Sharkara and Syrup

S.No	Sharkara	Syrup
1	Prepared by boiling 2 parts sugar with 1 part liquid like Hima, Phanta, Kashaya, or Arka	It is a concentrated solution of sugar in water. The concentration of sugar is 66% w/w
2	Types- No	a. Simple Syrup b. Medicated Syrup c. Flavored Syrup
3	Method of preparation- Hot process	a. Hot process b. Agitation c. Addition of Sucrose to a liquid medication or flavored liquid d. Percolation
4	Additives- No additives	Chemical Stabilizers, Colouring Agents, Flavouring Agents, Preservatives

Importance of Temperature

Temperature have impact on the viscosity of the syrup. As the temperature increases viscosity of the syrup decreases and makes it thinner and more fluid. This happens as the molecules in the syrup gains more kinetic energy, which causes them to move more freely and not stick together as much. Due to this, Syrup becomes more thinner and becomes easy to pour. If the temperature decreases, the viscosity of the syrup increases, causing the syrup thicker and more viscous. As the temperature decreases the molecules in the syrup lose kinetic energy. Due to this the molecules move more

slowly and stick together more. The syrup becomes thicker and difficult to pour.

Precaution

1. Heating should be proper to avoid fermentation of the caramel
2. Add small quantity of purified water for sucrose dissolution
3. There should be proper storage, Filtration and cooling

Confirmatory Tests

1. It should be 1-2 thread consistency.
2. It should settle down without spreading when put into water.
3. It should have the color and smell of the ingredients used.

Dosage and Anupana

½ - 1 pala with Goksheera, Jala

Packing

Syrups can be packed in either Glass or Plastic bottles. Glass bottles are superior when compared to Plastic bottles.

Preservation

Syrups can be preserved by storing the syrup at low temperature and adding the preservatives like Glycerine, Benzoic acid, Sodium benzoate, Methylparaben, or Alcohol.

Shelf Life

Shelf life of the Sharkara is 3 years

Example

Tulasi Arka Sharkara (Anubhoota yoga)

Ingredients

S.No.	Ingredients	Quantity
1	Tulasi Arka	1 Part
2	Sugar	2 Parts

Method of Preparation

To 1 part of Tulasi Arka, 2 parts of Sugar is added and boiled over the mild fire until it attains the Syrup consistency. Later it has to be filtered and preserved in air tight container.

Dose: 5 - 10 ml

Anupana: Jala

Indication: Kasa, Swasa and Pratishyaya.

Nimbu Sharkara (Anubhoota yoga)

Ingredients

S.No.	Ingredients	Quantity
1	Nimbu swarasa	1 Part
2	Sugar	2 Parts

Method of Preparation

To 1 part of Nimbu swarasa, 2 parts of Sugar is added and boiled over the mild fire until it attains the Syrup consistency. Later it has to be filtered and preserved in air tight container.

Dose: 5- 10 ml

Anupana: Jala

Indication: Mandagni, Aruchi, Trishna, Ajirna, Malavarodha, Raktadoshanashaka, Pittashamaka

Quality Control Parameters For Syrup

1. Colour
2. Odour
3. Taste
4. Viscosity
5. pH
6. Total solids
7. Reducing sugars/Non-reducing sugars
8. Total sugars
9. Specific gravity at 25 C
10. TLC/HPTLC/HPLC/LC-MS (any one or all)
11. Test for heavy/toxic metals- Lead, Cadmium, Mercury, Arsenic
12. Pesticide residue- Organo chlorine pesticides, organophosphorus pesticides, pyrethroids(Limits as per ASU Pharmacopoeia)
13. Microbial contamination- Total viable aerobic count, Enterobacteriaceae, Total fungal count (Limits as per ASU Pharmacopoeia)
14. Test for specific pathogen- Escherichia coli, Salmonella spp., Staphyloccocus aureus, Pseudomonas aeruginosa (Limits as per ASU Pharmacopoeia)
15. Aflatoxins (Limits as per ASU Pharmacopoeia) (B1, B2, G1, G2)
16. Shelf life

Gudapaka Kalpana

Introduction

Gudapaka is one of the dosage forms mentioned in Ayurvedic Pharmaceutics. Here guda is the main or predominant ingredient. Guda acts as binding agent and also as preservative.

Method of Preparation

Main Ingredients

1. Dravadravya- Swarasa, Kashaya or other liquid as specified.
2. Madhura dravya- Guda
3. Oushadha/Prakshepaka Dravya

Method

The specified quantity of Guda is dissolved in dravadravya and dissolve it. The mixture is filtered through a cloth to remove any physical impurities. The filtrate is taken in a wide mouth vessel and subjected to moderate heat until 2-3 thread consistency. The vessel is taken out from the fire. Add the fine powders of the Oushadha/prakshepaka dravyas little by little and mixed homogenously. Madhu should be added and mixed thoroughly after complete cooling.

Gudapaka Siddha Lakshana

यदा दर्वीप्रलेपः स्यात्यदा वा तन्तुली भवेत्। तोयपूर्णे च पात्रे तु क्षिप्तो न प्लवते गुडः।।
क्षिप्तस्तु निश्चलस्तिष्ठेत्पतितस्तुन शीर्यति। एष पाको गुडादीनां सर्वेषां परिकीर्तितः।
सुखमर्दः सुखस्पर्शो गन्धवर्णरसन्वितः। पीडितो भजते मुद्रां गुडः पाकमुपागतः। (Vai. Pa. Pra.2/52-54)

During the Preparation

1. Paka starts sticking to the ladle.
2. Paka forms like strings (2-3 strings) when pressed between thumb and index finger.
3. Paka settles down in the bowl of water without spreading

After the Preparation

4. Gudapaka is soft to touch and having the odour and the color of the ingredients
5. Finger print will be impregnated when it is pressed

Precautions

1. Mild fire should be maintained
2. Mixture of liquid and guda should be filtered to remove physical impurities.

Packing and Preservation

Gudapaka should be packed in air tight wide mouth container. The Lehya should

be kept in glass or porcelain jars. It can also be kept in a metal container which does not react with it.

Matra and Anupana

1 karsha with Goksheera, Jala

Shelf Life

1 year according to classics

3 years according to revised guidelines

Gudapaka Kalpana Quality Control Parameters For Syrup

1. Colour
2. Odour
3. Taste
4. Viscosity
5. pH
6. Total solids
7. Reducing sugars/Non-reducing sugars
8. Total sugars
9. Specific gravity at 25°C
10. TLC/HPTLC/HPLC/LC-MS (any one or all)
11. Test for heavy/toxic metals- Lead, Cadmium, Mercury, Arsenic
12. Pesticide residue- Organo chlorine pesticides, organophosphorus pesticides, pyrethroids (Limits as per ASU Pharmacopoeia)
13. Microbial contamination- Total viable aerobic count, Enterobacteriaceae, Total fungal count (Limits as per ASU Pharmacopoeia)
14. Test for specific pathogen- Escherichia coli, Salmonella spp., Staphyloccocus aureus, Pseudomonas aeruginosa (Limits as per ASU Pharmacopoeia)
15. Aflatoxins (Limits as per ASU Pharmacopoeia) (B1,B2,G1,G2)
16. Shelf life

Example

Manibhadra Guda

विडङ्गसारामलकाभयानां पलत्रयं त्रीणि पलानि कुम्भात्। गुडस्य च द्वादश मासमेष जितात्मनां हन्त्युपयुज्यमानः।।
कुष्ठश्वित्रश्वासकासोदरार्शोमेहप्लीहग्रन्थिरुग्जन्तु गुल्मान्। सिद्धं योगं प्राह यक्षो मुमुक्षोर्भिक्षोः प्राणान्माणिभद्रः किलेमम्।।

(A.Hri.Chi.St 19/31-32)

Ingredients

S.No.	Ingredients	Quantity
1	Vidangsara	1 pala
2	Amalaki	1 pala
3	Haritaki	1 pala
4	Trivruth	3 pala
5	Guda	12 pala

Method of Preparation

Take the Guda along with the required quantity of water in a vessel and heat it over moderate fire to obtain guda paka. Later add the mixture of fine powders of the remaining drugs to guda paka and mix it thoroughly. Then roll it in to spherical shape of the weigh about 1 gm and dry. Then preserve in air tight container in shade.

Dose and Anupana

6-12 gms with Ksheera

Indication

Kustha, Switra, Swasa, Kasa, Udara, Arsha, Prameha, Pleeha, Grantiruja, Jantu, Gulma

Guda Pippali

विडङ्गं त्र्यूषणं कुष्ठं हिङ्गु लवणपञ्चकम्। त्रिक्षारं फेनकं वह्निः श्रेयसी चोपकुञ्चिका।।
तालपुष्पोद्भवक्षारं नाड्यः कूष्माण्डकस्य च। अपामार्गस्य चिञ्चायाश्चूर्णानि चिक्कणानि च।।
सर्वचूर्णसमं देयं चूर्णमत्र कणोद्भवम्। एतस्माद्द्विगुणाच्चूर्णात्पुराणो द्विगुणो गुडः।।
मर्दयित्वा दृढे पात्रे मोदकानुपकल्पयेत्। भक्षयेदुष्णतोयेन प्लीहानं हन्ति दुस्तरम्।।
यकृतं पञ्चगुल्मञ्च ह्रुदरं सर्वरूपकम्। जीर्णज्वरं तथा शोथं कासं पञ्चविधं तथा।
अश्विभ्यां निर्मिता श्रेष्ठा बालानां गुडपिप्पली।। (B. R. Pleeharogadhikara 41 /44-48)

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Ingredients

S.No.	Ingredients	Quantity
1	Vidanga	1 part
2	Shunti	1 part
3	Maricha	1 part
4	Pippali	1 part
5	Kushta	1 part
6	Hingu	1 part
7	Sauvarcala Lavana	1 part

8	Saindhava Lavana	1 part
9	Vida Lavana	1 part
10	Samudra Lavana	1 part
11	Audbhida Lavana	1 part
12	Svarjikshara	1 part
13	Yava kshara	1 part
14	Tankana	1 part
15	Phenaka (Samudraphena)	1 part
16	Vahni (Chitraka)	1 part
17	Sreyasi (Gajapippali)	1 part
18	Upakunchika	1 part
19	Talapushpodbhava kshara	1 part
20	Kushmandadi kshara	1 part
21	Apamarga kshara	1 part
22	Chincha kshara	1 part
23	Kana (Pippali)	22 Parts
24	Puratana guda	88 Parts

Method of Preparation

Ingredients 1 to 23 are finely powdered, added to the Guda and kneaded well in a mortar with pestle to form a homogenous mixture.

Dose and Anupana

6 to 12 g with Water or Milk

Indication

Pleeha Roga, Udara, Gulma, Kasa, Jeernajvara, Shotha, Yakrut roga, Good for children

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Lavana Kalpana

Introduction

Lavana preparation is a unique preparation in Ayurveda used in many diseases. Lavana as such has therapeutic value used in many conditions like vatavyadhi by Sushruta, and consumption of lavana rasa first to pacify vata by Kashyapa. Bhavamishra explained the use of lavana and Ardraka in the beginning of the meal is good for srotasas, it acts as Ruchya, Kanta vishodhana.

Lavana Kalpana

Saindhava lavana is heated along with some herbal drugs to get the final product as lavana Kalpana.

General Method of Preparation

There are two types of preparation: 1. Lehapaka. 2. Putapaka

1. Lehapaka

Kashaya of the drugs are prepared first and reheated with Saindhava Lavana upto ghana kashaya. Later add the fine powders of the other drugs and mixed well. Eg. Abhaya Lavana.

2. Putapaka

Saindhava lavana is subjected to heat process along with some herbal drugs enclosed in Sharava samputa or lavana is filled into narikela with or without jala. Then subject it to puta paka. The final product obtained is called Lavana Kalpana. Eg Narikela Lavana

Temperature- 400° -800° C

Importance of Temperature

Temperature plays an important role in augmenting the therapeutic quality in the final product. In Lavana preparation, the temperature required depends upon the herbal drugs used and also to transfer the therapeutic quality of herbal drugs into Lavana. As per the classical references different putas are mentioned.

S.No.	Heat required	Lavana Kalpa
1	Mahaputa	Narikela Lavana
2	Gajaputa	Shwasari Lavana
3	Mandagni	Kukkuta Lavana
4	Heat with the wood of Karanja	Mahavruksha Lavana
5	Heat until the contents turn to black colour	Arka Lavana

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Precautions

Temperature should be appropriate to convert the contents into Grey to Black color.

Confirmatory Test

The final product should be Grey or Black color, Odor of the herbal drug which are used should be appreciated.

Preservation and Packing

Lavana is hygroscopic in nature and should be preserved and packed in an airtight container.

Shelf Life: 5 years

Narikela Lavana

नारिकेलं सतोयञ्च लवणेन प्रपूरितम्। मृदाऽववेष्टितं शुष्कं पक्वं गोमयवह्निना।।
पिप्पल्या भक्षितं हन्ति शूलं च परिणामजम्। वातिकं पैत्तिकञ्चापि श्लैष्मिकं सान्निपातिकम्।।

(B.R. Shoolarogadhikara 30/69-70)

Ingredients

S.No.	Ingredients	Quantity
1	Matured Coconut with coconut water	1 No
2	Saindhava Lavana	Q. S

Method of Preparation

A fully matured Coconut without fibers has to be taken. A hole is made in one of the eyes with the help of a knife. Powdered Saindava lavana has to be filled in to coconut through the hole until the cavity is filled with Saindhava lavana. The hole is closed with a cork and the whole coconut is smeared with 3 layers of mud smeared cloth. Then it is kept under sunlight to dry completely and subject to puta with 10-15 cow dung cakes. After self-cooling, mud layer and shell are separated. Burnt carnal of coconut and Lavana together were subjected to mardana and preserved in an air-tight glass bottle.

Note: As per Rasatarangini, coconut water has to be removed before filling saindhava lavana.

Dose and Anupana

1-2 gms along with Pippali churna, followed by warm water

Indication

Vataja-Pittaja-Kaphaja-Sannipataja parinama shula

Arka Lavana

सुचूर्णितं सैन्धवन्तु समार्कदलसंयुतम्। अन्तर्धूमं पचेद्धीमान्स्वाङ्गशीतमथोद्धरेत्।।
जायते खल्वसम्पिष्टं लवणं कज्जलप्रभम्। आयुर्वेदाचार्यवर्यैर्नाम्नार्कलवणं मतम्।।
यकृत्प्लीहोदरं रुचिरं मलभेदनम्। विशेषतः समाख्यातं तन्त्रेऽर्कलवणं बुधैः।।
माषाकार्द्धं मितं त्वर्कलवणं कोष्णवारिणा। पथ्याशिभिस्तु पुरुषैः सततं परिशीलतम्।।
वातिकं श्लेष्मिकं वापि सज्वरं वाऽपि विज्वरम्। सकोष्ठबद्धं व्यथया चीत्कारयुतयापि वा।।

(R.T. 14/131-135)

Ingredients

S.No.	Ingredients	Quantity
1	Arka Patra	1 part
2	Saindhava Lavana	1 part

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Method of Preparation

One layer of clean and healthy Arka Patra is placed in a Sharava and fine powder of Saindhava Lavana is spread evenly over Arka Patra. Again another layer of Arka Patra is placed and Saindhava Lavana is spread. 3-4 alternate layers of Arka Patra and Saindhava Lavana is placed. Sharava Samputa is prepared and Sandhibandhan is done and subjected to puta with 15-20 cow dung cakes. After swanga sheeta, the sharara samputa is opened, the material is collected and subjected to mardana to mix the contents properly and stored in an airtight container.

Dose: ½ Masha (500 mg)

Anupana: Ushna Jala

Indication: Yakrit vikara, Pleeha vikara, Udara, Atisara, Vishama Jwara

Kshara Kalpana

Introduction

Kshara Kalpana is the pharmaceutical process of extraction of alkali from the plant. The prepared kshara is equal to agni and cures gulma and shula. Kshara Kalpana can be used both internal and external administration. Considering its karma it is also called as "Anushastra"

Definition

क्षरति इति क्षारः। (Sha.Ka.Dru)

तत्र क्षरणात् क्षणनाद् वा क्षारः। (Su.Sam, Su.St. 1¼)

One which cuts off the twak, dooshita mamsa, vitiated doshas and removes from the body is called Kshara.

Kshara Karmukata (Mechanism of Action of Kshara)

छित्वा छित्वाऽऽशयात्क्षारः क्षरत्वात्क्षारयत्यधः।। (Cha.Sam Chi.St, 5/58)

As Kshara is having Ksharana Property, it cuts off the Vitiated tissues and removes from the body.

Importance of Kshara in Chikitsa

शस्त्रानुशस्त्रेभ्यः क्षारः प्रधानतमः। छेद्यभेद्यलेख्यकरणात्त्रिदोषघ्नत्वात्त्विशेषक्रियावचारणाच्च।।।

(Su.Sam, Su.St. 11/3)

सर्वशस्त्रानुशस्त्राणांक्षारः श्रेष्ठो बहूनि यत्। (Arunadatta)

- Among all the Shastra and Anushastra, Kshara is superior considering its wide therapeutic applicability.
- Alone Kshara does the function of Chedana, Bhedana, Lekhana and Tridosha Shamana.

- Kshara is indicated in treatment where shastra karma can't be done like in the location of marma.
- It is more suitable for Children, Women and those who afraid of Shastra Karma.
- It checks the bleeding and cures the diseases.
- There are no chances of infection of the wound.

Types of Kshara

I. Based on Prayoga

1. Paniya Kshara	:	For Abhyantara Prayoga (Internal Administration)- Ksharodaka
2. Pratisaraniya Kshara	:	For Bahya Prayoga (External application)- Mridu, Madhyama and Teekshna Kshara

II. Based on the Number

1. Eka Kshara	:	Sarjakshara
2. Dwikshara	:	Sarjakshara, Yavakshara
3. Trikshara	:	Sarjakshara, Yavakshara and Tankanakshara
4. Ksharapanchaka	:	Sarjakshara, Yavakshara, Apamarga kshara, Tila kshara, Palasha kshara
5. Ksharastaka	:	Sarjakshara, Yavakshara, Apamarga kshara, Tila kahara, Palasha kshara, Chincha kshara, Arka kshara, Sudha

III. Based on the origin

1. Vanaspatija	:	Yavakshara, Palasha kshara, Kadali kanda kshara
2. Pranija	:	Shankha, Shukti, Kaparda
3. Khanija Naisargika	:	Sarjakshara, Tankana, Suryakshara
4. Kritrima	:	Sodium Borate

IV. Based on Strength

1. Mridu
2. Madhyama
3. Teekshna

Plants Used to Procure Kshara

कुटज पालाशाश्वकर्ण पारिभद्र बिभीतकारग्वध तिल्वकऽर्क स्नुह्यपामार्ग पाटला नक्तमाल वृष कदली चित्रक पुतिकेन्द्रवृक्षास्फोताअश्वमारक सप्तच्छदाग्निमन्थ गुञ्जाश्वतस्थश्च कोशातकी समूलफलपत्रशाखादहेत्।

(Su.Sam.Su.St. 11/12)

1. Kutaja,
2. Palasa,
3. Ashwa karna,
4. Paribhadra,
5. Vibhitaki,
6. Aragvadha,
7. Tilvaka (Lodra)
8. Arka,
9. Snuhi,
10. Apamarga,
11. Patala,
12. Naktamala,
13. Vasa,
14. Kadali,
15. Chitraka,
16. Putika,
17. Indravriksa,
18. Asphota,
19. Ashvamara,
20. Saptacchada
21. Agnimantha,
22. Gunja,
23. Koshataki

General Method of Preparation

क्षीरवृक्षस्य काष्ठानि शुष्काण्यग्नौ प्रदीपयेत्।।
नीत्वा तद्भस्ममृत्पात्रे क्षिप्त्वा नीरे चतुर्गुणे। विमर्द्य धारयेद्रात्रौ पतरच्छं जलं नयेत्।।
तन्नीरं क्वाथयेद्यावत्सर्वं विशुष्यति। ततः पात्रात्समुल्लिख्य क्षारो ग्राह्यः सितप्रभः।।

(Sha.Sam., Ma.Kha, 11/102-104)

- The drug selected for Kshara should be completely dried.
- It is burnt into ashes in a place where there is no direct wind or breeze.
- Ashes are collected and mixed with 4 parts of water in an earthen vessel.
- Then the ashes are Rubbed with hands in water and kept undisturbed overnight.
- Next day morning the supernatant liquid has to be decanted to another vessel and kept for boiling until the complete evaporation of water.
- The fine white colored powder remains at the bottom of the vessel is collected and used as Kshara.

Other References Regarding Kshara Preparation

References	Quantity of water
Sushruta	6 parts
Rasatarangini	4 parts
Dravyaguna Vijnana	6 parts
Paribhasha Pradeepa	6 parts

The method explained in Paribhasha Pradeepa can be adopted for the preparation of Kshara.

क्षारवृक्षस्य पञ्चाङ्गं शुष्कमग्नौ प्रदीपयेत्। नीत्वा तद्भस्म मृत्पात्रे क्षिप्त्वा नीरे तु षड्गुणे।।
विमर्द्य धारयेद्रात्रौ प्रातरच्छं जलं नयेत्। एकविंशतिवारांस्तद्वाससा स्रावयेज्जलम्।।
तन्नीरं क्वाथयेद्यावत्सर्वं विशुष्यति। ततः पात्रात् समुल्लिख्य क्षारो ग्राह्यः सितप्रभः।। (Paribhaasha pradipa)

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- The dried Panchanga of the Oushadha is burnt into ashes.
- Add 6 parts of water in a big vessel.
- Rub the ashes in water and Keep undisturbed whole night.
- Next day morning filter it through a cloth
- The decanted water is again filtered for 21 times (for every filtration 1 layer of cloth should be increased)
- Now the filtrate is kept for boiling over the moderate fire until the water dries up
- The white colored fine powder obtained at the bottom of the vessel is Kshara.

Kshara Sutra Preparation

भावितं रजनीचूर्णैः स्नूहीक्षीरे पुनः पुनः। (Cha. Da.Arsha Chikitsa 148)

Even though the use of Kshara sutra for Bhagandhara is explained in Sushruta Samhita, the method of preparation is not explained. A little explanation is available in Chakradatta. The thread has to be processed so many times with Snuhi Ksheera mixed with Haridra choorna. And it has to be air dried and packed in air tight container.

As this procedure is not clear, in BHU a team of doctors after trial and error method came to conclusion regarding the method of preparation of kshara sutra.

Material Required

1. Thread- 20 numbered surgical Linen thread.
2. Kshara sutra Cabinet - Cabinet with Hangers for tying the thread.

Drugs

1. **Snuhi Ksheera**– Latex of Euphorbia nerifolia.
2. **Apamarga Kshara**– Kshara prepared from Achyranthus aspera.
3. **Haridra Choorna**– Choorna of Haridra.

Method of Kshara Sutra Preparation

The thread is tied to the hangers and placed in its position. Total 21 coatings have to be applied to the thread in a specific manner.

- Initially 11 coatings are applied with Snuhi Ksheera.
- Next 7 coatings are applied with the mixture of Snuhi ksheera and Apamarga Kshara.
- Last 3 coatings are with the mixture of Snuhi ksheera and Haridra Choorna. Then the threads are allowed to dry and then it is sterilized by UV light.

Packing and Preservation

The prepared threads are cut into desirable length about 10-15 cm and packed

in small polyethene covers. Maximum ten threads are packed in cover. Further these covers are placed in a glass tube and sealed along with a silica bag. These glass tubes are placed in a chamber for UV radiation for complete sterilization. The sealing of the tube is broken at the time of utilization. The threads have to be utilized with in six months from the date of opening of the tube.

Shelf Life

The threads have shelf life of 5 years when sealed in glass tube without breakage.

Precaution

1. The drug should be dried completely.
2. It should be burnt in nirvata pradesha
3. The liquid should be filtered for 21 times.
4. The filtrate should have gomutra varna.

Examples

Kadali Kshara

Reference- Sushruta Samhita Sutrasthana 11

Ingredients

S.No.	Ingredients	Quantity
1	Kadali Bhasma	1 part
2	Jala	6 parts

Method of Preparation

The dried Panchanga of the Kadali is burnt into ashes. Add 6 parts of water in a big vessel. Rub the ashes in water and Keep undisturbed whole night. Next day morning filter it through a cloth. The decanted water is again filter for 21 times. Now the filtrate is kept for boiling over the moderate fire until the water dries up. The fine powder obtained at the bottom of the vessel is Kadali Kshara.

Dose & Anupana: 1-2 Ratti with Jala

Indication: Gulma, Pleeha, Jeerna Jwara, Garavisha, Visuchika, Ashmari and Shopha.

Chincha Kshara

Ingredients

S.No.	Ingredients	Quantity
1	Chincha Phala Twak Bhasma	1 part
2	Jala	4 parts

Method of Preparation

The dried Phala Twak of the Chincha is burnt into ashes. Add 4 parts of water in a big vessel. Rub the ashes in water and Keep undisturbed whole night. Next day morning filter it through a cloth. The decanted water is again filter for 21 times. Now the filtrate is kept for boiling over the moderate fire until the water dries up. The fine powder obtained at the bottom of the vessel is Chincha Kshara.

Dose & Anupana: 1-2 Ratti with Jala

Indication: Agnimandya, Gulma, Shula, Mootrakruchchra, Ashmari (R.T.14/109)

Ayaskriti Kalpana

Introduction

When we look in to the chronological development of Oushadha Kalpana, in the beginning, treatments were done with mantra, tantra, herbal drugs in raw form. Later converting the herbal drugs in to Panchavidha Kashaya Kalpana then upgrading them to secondary preparations like Sneha, Avaleha, Vati etc., Kalpana. During Samhita period metals were used in the fine powder form called "Ayaskriti"

The term "Ayaskriti" consists of two words "Ayas" and "Kriti" meaning "Loha" and "Injuring, hurt, hurting" respectively. The meaning is reducing the Iron into smaller particles. Here Iron represents other metals also like Gold, Silver etc., Hence Ayaskriti is the process of converting the metals into small particles to make it fit for internal administration.

The references of Ayaskriti is present in Brihatrayi in different names

1. In Charaka Samhita Chikitsa Sthana 1: 3/15 mentioned as Lauha Rasayana.
2. In Sushruta Samhita Chikitsa Sthana 10/11 mentioned as Aushadha Ayaskriti and Maha aushadha Ayaskriti.
3. In Astanga Hridaya Chikitsa Sthana 12/28-32 mentioned as Ayaskriti. As Astanga Hridaya is the latest work among Brihatrayi , the word Ayaskriti is used to denote the preparation.

1. Lauha Rasayana

त्रिफलाया रसे मूत्रे गवां क्षारे चलावणे। क्रमेण चेक्षुदीक्षारे किंशुकक्षार एवच।।
तीक्ष्णायसस्य पत्राणि वह्निवर्णानि साधयेत्। चतुरङ्गलदीर्घाणि तिलोत्सेधतनूनि च।।
ज्ञात्वा तान्यञ्जनाभानि सूक्ष्मचूर्णानि कारयेत्।। तानि चूर्णानि मधुना रसेनामलकस्य च।।
युक्तानि लेहवत्कुम्भे स्थितानि घृतभाविते। संवत्सरं निधेयानि यवपल्ले तथैव च।।
दद्यादालोडनं मासे सर्वत्रालोडयन्बुधः। संवत्सरात्यये तस्य प्रयोगो मधुसर्पिषा।।
प्रातःप्रातर्बलापेक्षी सात्म्यं जीर्णे च भोजनम्। एष एव च लौहानां प्रयोगः सम्प्रकीर्तितः।।
नाभिघातैर्न चातङ्कैर्जरया न च मृत्युना। स धृष्यः स्याद्गजप्राणः सदा चातिबलेन्द्रियः।।

धीमान्यशस्वी वाक्सिद्धः श्रुतधारी महाधनः। भवेत् समां प्रयुञ्जानो नरो लोहरसायनम्।।
अनेनैव विधानेन हेम्नश्च रजतस्य च। आयुः प्रकर्षकृत्सिद्धः प्रयोगः सर्वरोगनुत्।। (Cha.Sa, Chi.St. 1: 3/15)

Teekshna loha is made into thin pieces of the measurement of 4 angula (6.7 cm) in length and breadth, thickness of about Tila (0.94 mm). These Loha patras are heated to red hot and dipped several times in Triphala Kwatha, Gomutra, Ksharodaka, Lavanodaka, Ingudi kshara jala and Palasha kshara jala respectively. When Loha patras turn red color it has to be made in to fine powder in a khalwa yantra.

The sookshma choorna of loha is mixed with Madhu and Amalaki swarasa to make like Avaleha consistency in an earthen pot which was smeared with Ghrita. The mouth of the pot is sealed properly and kept in the heap of Yava for 1 year. Once in a month the pot has to be opened and mixed thoroughly and sealed again. After the completion of 1 year the product is taken out from the pot and administered in the morning along with Madhu and Ghrita considering the shareera and again bala. After the digestion of the medicine the person has to take congenial food.

Proper administration of this yoga makes the person live longer without the fear of old age and death. The physical strength becomes strong like elephant and sense organs remain sharp for longer duration. The person becomes wise, Successful in all the activities, Whatever he speaks will becomes true. Everybody likes to hear his speech, he becomes very rich person.

In the same way we can prepare Rasayana from Swarna and Rajata also. The use of Swarnakriti and Rajatakriti gives healthy long life and also cures all the diseases.

2. Aushadha Ayaskriti and Maha Aushadha Ayaskriti

तीक्ष्णलोहपत्राणि तनूनि लवणवर्गप्रदिग्धानि गोमयाग्निप्रतप्तानि त्रिफलाशालसारादिकषायेण निर्वापयेत्षोडश-वारान्, ततः खदिराङ्गारतप्तान्युपशान्ततापानि सूक्ष्मचूर्णानि कारयेद् घनतान्तवपरिस्रावितानि, ततो यथाबलं मात्रां सर्पिर्मधुभ्यां संसृज्योपयुञ्जीत, जीर्णे यथाव्याध्यनम्लमलवणमाहारं कुर्वीत, एवं तुलामुपयुज्य कुष्ठमेहमेदः श्वयथुपाण्डुरोगोन्मादापस्मारानपहत्य वर्षशतं जीवति, तुलायां तुलायां वर्षशतमुत्कर्षः, एतेन सर्वलौहेषु अयस्कृतयो व्याख्याताः।। (Su.Sam, Chi.St. 10/11)

Teekshna loha is made into thin sheet and smeared with the paste of pancha lavana. Later it is heated to red hot in the fire of gomaya and dipped into Triphala Kashaya and Salasaradi gana dravya Kashaya for 15 times respectively.

Later this Iron sheets are heated to red hot in the fire of Khadira and allowed to cool down on its own. The Iron sheets are taken in a khalwa yanta and made it in to fine powder.

The fine powder is administered considering dehabala with Madhu and Ghrita. The person has to follow Pathyahara during Oushadha sevana kala. Usual dose of Ayaskriti is from 5 ratti to 1 masha. It cures Kustha, Prameha, medoroga, Shotha, Pandu,

Unmada, Apasmara. The person lives up to 100 years. If a person consumes the same drug for the second consecutive time he lives addition of 100 years.

In the same way, we can prepare the medicine from all the metals.

Ayaskriti

साधयेदसनादीनांपलानांविंशतिंपृथक्। द्विवहेऽपांक्षिपेत्तत्रपादस्थेद्वेशतेगुडात्।।
क्षौद्राढकार्धपलिकंवत्सकादिंचकल्कितम्। तत्क्षौद्रपिप्पलीचूर्णप्रदिग्धेघृतभाजने।।
स्थितंदृढेजतुसृतेयवराशौनिधापयेत्। खदिराङ्गारतप्तानिबहुशोऽत्रनिमज्जयेत्।।
तनूनितीक्ष्णलोहस्यपत्राण्यालोहसङ्क्षयात्। अयस्कृतिः स्थितापीतापूर्वस्मादधिकागुणैः।।

(A.Hri.Chi.St. 12/28-32)

Ingredients

S.No.	Ingredients	Quantity
1	Asanadi gana dravya	20 pala each
2	Jala (for Kashaya)	1 vaha (drona)
3	Guda	200 pala
4	Madhu	½ adaka
5	Vatsakadi gana dravya	1 pala each

Method of Preparation

- The coarse powder of Asanadi gana dravya are added to jala and boil to prepare the Kashaya by reducing it to ¼ part. The prepared Kashaya is filtered through the cloth and add guda and stir it to dissolve. The mixture is filtered once again to remove any physical impurities of Guda.
- Later the mixture is transferred in to another Mud pot which was fumigated and smeared with Ghrita, Madhu and Pippali Choorna. Powders of a Vatsakadi gana dravyas and madhu are added to the pot and stirred well.
- A thick coating of laksha applied to the outer surface of the mud pot and placed in the heap of Yava.
- Thin sheets of Teekshna loha are heated to red hot in the fire of Khadira wood and dipped into the pot containing the Kashaya. The process is repeated until loha sheets are converted into powder.
- The mouth of the pot is sealed and placed in the heap of Dhanya for 15 days. After 15 days it can be used as Ayaskriti

Dose & Anupana: 5 ratti to 1 masha (625 mg - 1 gm) with Madhu and Ghrita

Indication: Kustha, Prameha, medoroga, Shotha, Pandu, Unmada, Apasmara

Shelf life: Perpetual; **As per Revised Guidelines:** 10 years

Lepa Kalpana

Introduction

Lepas are one among Bahihparimarjana Chikitsa used extensively in skin diseases.

Synonyms

आलेपस्य च नामानि लिप्तो लेपश्च लेपनं। (Sha.Sam,U.Kha 11/1)

Alepa, liptha, lepa and Lepana.

Definition

द्रव्यमार्द्रं शिलापिष्टं शुष्कं वा सद्रवं तनु। देहे प्रलेपनार्थः तल्लेपा इत्युच्यते बुधैः। (Dra. Vi by Yadavji)

The paste is applied over the parts of the body prepared from the fresh drugs or dry drugs adding water and subjecting them to mardana.

Karmukata of Lepa

प्रह्लादने शोधने च शोफस्य हरणे तथा। उत्सादने रोपने च लेपः तादर्थकृत्। (Su.Sam.Chi.St. 1/16)

Lepa produces refreshens (Comfort, rejoice), Shodhana, reduces swelling, utsadana, heals the wound.

Method of preparation of Lepa

Lepas are generally prepared from both ardra and shushka dravyas. If lepa has to be prepared with ardra dravyas, ingredients are subjected to mardana without adding liquid media to fine paste. If lepa has to be prepared with shushka dravyas, the prescribed liquid is added to the mixture of the fine powders and subjected to grinding until the proper consistency is attained so that it can be applied to the specified part of the body.

Liquid Media used for Lepa Preparation

Generally, Jala, Gomutra, Taila, Ghruta, Swarasa, Kashaya etc. are used to prepare lepa.

CHAPTER ELEVEN

Types of Lepa

दोषघ्नो विषहा वर्ण्यो मुखलेपस्त्रिधा मतः। (Sha.Sam,U.Kha 11/1)

स त्रिविधः प्रलेपः प्रदेहः आलेपश्च। (Su.Sam, Su.St. 18/6)

दशविधश्चसमासादालेपः यथा– स्नैहिकः निर्वापणप्रसादनस्तम्भनं विलायनपाचनपीडनशोधनरोपणसवर्णीकरणश्च। (A. Sam)

According to Sharanghadara it is of three types;

1. Doshaghna
2. Vishaghna
3. Varnya

According to Sushrutha,

1. Pralepa
2. Pradeha
3. Alepa

According to Astanga Samgraha,

1. Snaihika
2. Nirvapana
3. Prasadana
4. Stambhana
5. Vilayana
6. Pachana
7. Pidana
8. Shodhana
9. Ropana
10. Savarnikarana.

Quantity of Sneha Dravyas Used in Lepa

षड्भागं पैत्तिके स्नेहं चतुर्भागंतु वातिके। अष्टभागन्तु कफजे स्नेहमात्रं प्रदापयेत्। (Su.Sam, Su.St. 18/11)

Sneha is one of the ingredients of Lepa irrespective of dosha involved.

Vyadhi	Quantity of Sneha
Vataja	¼th part
Pittaja	⅙th part

Method of Application of Lepa

a. Direction

तत्र प्रतिलोमम् आलिम्पेत्। प्रतिलोमे हि सम्यगौषधं अवतिष्ठते अनुप्रविशति च रोमकूपान् स्वेदवाहिभिश्च सिरामुखैवीर्यं प्राप्नोति। (Su.Sam, Su.St. 18/4)

Lepa should always done in pratiloma gati (opposite to the direction of hair follicle), so that it fecilitates the absorption of veerya of lepa through hair root, sweat glands and capillaries.

b. Thickness of Lepa

त्रिप्रमानाश्चतुर्भागत्रिभागाअर्धागुलोन्नतः। (Sha.Sam, U.Kha. 11/2)

S.No	Lepa	Thickness
1	Doshaghna	¼ angula
2	Vishaghna	⅓ angula
3	Varnya	½ angula

c. Time of Application

न रात्रौ लेपनं कुर्याच्छुष्यमाणं न धारयेत्।। शुष्यमाणमुपेक्षेत प्रदेहं पीडनं प्रति।
(तमसा पिहितो ह्यूष्मा रोमकूपमुखे स्थितः।। विना लेपेन निर्याति रात्रौ नोलेपवेदतः) (Sha.U.Kha. 11/74-76)
रात्रावपिप्रलेपादिविधिः कार्योविचक्षणः।। अपक्वशोथेगम्भीरेरक्तश्लेष्मसमुद्भवे।

- Lepa should not be applied during night time. i.e. Lepa should apply during day time only. If lepa applied during night time heat doesn't come out of the body as lepa covers the pores of the skin except for Apakwa shotha, Gambhira shotha, Raktaja and Shlemaja Shotha.
- Lepa should not be retained after it dries up
- Pradeha can be retained after drying.

d. Duration of Lepana

आद्रौ व्याधिहरः स स्यात् शुष्को दूषयति च्छविम्।। (Sha.Sam, U.Kha 11/2)

Lepa are having potency as long as they are moist. If they dries up they may harm the skin

Pralepa

प्रलेपःशीतस्तनुरविशोषी विशोषी वा। (Su.Sam, Su.St. 18/6)

Pralepa is sheeta, tanu, vishoshi or avishoshi, indicated in Pittaja vikaras and acts as sandhana. It does shodhana and ropana of shopha and reduces pain. It can be used both in injured and not injured shopha.

Pradeha

प्रदेहःप्रदेहस्तूष्णः शीतो वा बहलोऽबहुरविशोषी च। (Su.Sam, Su.St. 18/6)

प्रदेहोवातश्लेष्मप्रशमनः सन्धानः। शोधनोरोपणः शोफवेदनापहश्चज।। तस्योपयोगः क्षताक्षतेषु।।

(Su.Sam, Su.St. 18/7)

Pradeha is Ushna or Sheeta, Bahala, useful in Vata and Kaphaja vikaras

Alepa

मध्यमो अत्र आलेपः (Su.Sam, Su.St. 18/6)

Alepa is Madhyama, useful in Rakta and Pittaja Vikaras

Temperature

When Lepa has to be prepared by heating the ingredients, it is always advised to heat it over mild fire.

Precautions

1. Lepa is meant for single use, the same lepa should not be used for the second time
2. Lepa should be removed when it dries up.
3. Fine paste without any fibres should be prepared when wet drugs are used.
4. If it is prepared from dry drugs, then very fine powder has to be used.
5. Lepa should be applied against the direction of hair follicle for the better absorption.

Confirmatory Test

The consistency of paste should be easy to apply

Packing and Preservation

The mixture of fine powders has to be packed in air tight containers.

Shelf Life: 2 years.

Quality Control Parameters For Lepa/Malahara

1. Colour
2. Odour
3. Viscosity (If in the form of flowing material)
4. Rancidity test
5. Microscopy (if powdered drugs incorporated)
6. Particle size (if powdered drugs incorporated) of the ingredients
7. Total acidity
8. TLC/HPTLC/GC/GC-M S/HPLC (any one or all)
9. Assay (Wherever possible)
10. Uniformity of content
11. pH
12. Thermal stability
13. Total fat content
14. Loss on drying at 105^{0}C/Moisture content
15. Spreadibility
16. Test for heavy/toxic metals- Lead, Cadmium, Mercury, Arsenic
17. Pesticide residue- Organo chlorine pesticides, organophosphorus pesticides, pyrethroids (Limits as per ASU Pharmacopoeia)
18. Microbial contamination- Total viable aerobic count, Enterobacteriaceae, Total fungal count
19. Test for specific pathogen- Escherichia coli, Salmonella spp., Staphyloccocus aureus, Pseudomonas, aeruginosa
20. Aflatoxins (Limits as per ASU Pharmacopoeia) (B1,B2,G1,G2)
21. Shelf life

Examples

Avalgujadi Lepa

कुडवोऽवल्गुजबीजाद हरितालचतुर्थभागसम्मिश्रः। मूत्रेण गवां पिष्टः सवर्णकरणं परं श्वित्रे।। (A.Hr.Chi.St. 20/13)

Ingredients

S.No.	Ingredients	Quantity
1	Shuddha Bakuchi Beeja	1 kudava (192g)
2	Shuddha Haratala	¼ Kudava (1pala- 48 g)
3	Gomutra	Q. S

CHAPTER ELEVEN

Method of Preparation

Shuddha Bakuchi choorna and Shuddha Haratala are taken in a Khalwa yantra and subjected to bhavana with Gomutra until it attains the consistency of lepa and later applied to the affected part.

Indication: Switra.

Keshavardhaka Lepa

गोक्षुरस्तिलपुष्पाणि तुल्ये च मधुसर्पिषी।। शिरः प्रलेपनं तेन केशसंवर्धनं परम्। (Sha.Sam. U. Kha. 11/22-23)

Ingredients

S.No.	Ingredients	Quantity
1	Gokshura	1 part
2	Tila Pushpa (Flower of Sesame)	1 part
3	Madhu	1 part
4	Ghrita	1 part

Method of Preparation

Fine paste of the above ingredients is prepared and applied over the scalp.

Indication: Khalitya and Palitya.

Dashanga Lepa

शिरीषं मधुयष्टी च त गरं रक्तचन्दनम्। एला मांसी निशायुग्मं कुष्ठं बालकमेव च।
इति संचूण्यं लेपोऽयं पञ्चमांशघृतप्लुतः। जलेन क्रियते सुज्ञैर्दशाङ्गः इति संज्ञितः।
विसर्पान् विषविस्फोटाञ्शोथान् दुष्टाव्रणाञ्जयेत्।। (Sha.Sam.U.Kha, 1¼-6)

Ingredients

S.No.	Ingredients	Quantity
1	Shireesha Twak	1 part
2	Madhuyasti	1 part
3	Tagara	1 part
4	Raktachandana	1 part
5	Ela	1 part
6	Jatamamsi	1 part
7	Haridra	1 part
8	Daruharidra	1 part
9	Kushta	1 part
10	Baluka	1 part

Method of Preparation

Fine powders of all the ingredients are mixed properly and paste is prepared by adding ¼th part of Ghruta and sufficient quantity of water.

Indication: Visarpa, Visha, Vispotha, Shotha and Dushta vrana.

Shatadhoutha and Sahasradhoutha Ghruta

यत्पुनः पुनः सन्ताप्य शीताम्भसानिर्वाप्यते यथाविधसर्पिषि। 'शतंवारान्शीततोयेनधौतं फेनितं घृतम्' इतिईशानदेवः।। तद्गुणाः वातपित्तदाहक्षतनाशित्वम्।। (Vaidyaka Shabda Sindhu)

अथवाशतधौतेनसर्पिषाक्षीरजेनवा। (Sha.Sam.U.Kha., 1/4)

Ingredients

S.No.	Ingredients	Quantity
1	Goghrutha or Ksheerottha Ghrutha	1 Part
2	Sheeta Jala	2 Parts
3	Gomutra	Q. S.

Method of Preparation

Goghrutha is taken in a vessel and 2 parts of water is added to it and rubbed with hands for some times. Later water is decanted from the vessel and fresh cold water is added and repeated the same procedure totally for 100 times. This is called as Shatadhoutha Ghrutha, if the process is repeated for 1000 times, it is called as Sahasradhoutha Ghrutha. This is used for external application.

Indication: Daha, Dagdhavrana, Visarpa, Vispota

Discussion

There is no classical reference to Sharkara in Ayurvedic Classical textbooks. Based on the modern pharmaceutical dosage form Syrup Sharkara is formulated in Ayurvedic Pharmaceutics. It is palatable and useful for pediatric use. Gudapaka is a type of Agnisiddha vatikalpana bigger than vati. Here Guda acts as the main ingredient and the binding agent. Lavana Kalpana is a unique preparation of Ayurvedic Pharmaceutics as Lavana is also having therapeutic action. Kshara Kalpana is an Alkaline preparation considered as Anushastra having a wide range of therapeutic utility. It can be used both internally and external application and also prepared into kshara sutra utilized for arshas and Bhagandara. Ayaskriti is the Therapeutic preparation from the metals. Reference of Ayaskriti is found in Samhita period. During those days metals were converted into fine powder form along with other drugs. Later metals were converted into Bhasma form and hence its utility is not found in present days.

Lepa is specifically meant for Bahihparimarjana chikitsa. Based on the action of lepa it is of three types. Lepa is always applied in pratiloma gati for the better absorption of the drugs from the roma kupa.

Conclusion

Among these dosage forms except Ayaskriti remaining are very much useful in therapeutics depending upon roga lakshana

Extended Learning

- Discuss therapeutic importance of sharkara kalpana.
- Discuss therapeutic importance of Gudapaka.
- Discuss therapeutic importance of prepared Kshara kalpana and Ksharasutra integration with Shalya tantra department along with its packaging techniques.
- Discuss therapeutic importance of prepared Ayaskriti kalpana along with its shelf life and packaging techniques.

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MODEL QUESTIONS

Long Answers

- Explain the general method of preparation of Kshara kalpana with an example.
- Define Kshara and explain the method of preparation of different types of Kshara.
- Explain the general method of preparation, confirmatory test, method of application, and general rules of application with an examples.

Short Answers

- Write the general method of preparation of Sharkara.
- Difference between Sharkara and Syrup.
- Explain the method of preparation of Tulasi Arka.
- Describe the general method of preparation, confirmatory tests of Gudapaka.
- Explain the method of preparation of Manibhadra Guda.
- Explain the method of preparation of Guda Pippali.
- Describe the general method of preparation of Lavana Kalpana.
- Explain the method of preparation of Narikela Lavana.
- Describe the method of preparation, Indication and dose of Kadali kshara.
- Describe the method of preparation, Indication and dose of Chincha kshara.
- Explain the method of preparation of Lepa and its types.
- Explain Avalgujadi Lepa.
- Explain Keshavardhaka lepa.

CHAPTER 12

CHATURVIDHA RASAYANA

PAPER 1

Contents

Introduction, definition, importance, types, Procedure, necessary equipment, Shelf life with following example

Kharaliya Rasayana: Shwasakuthara rasa, Vatavidwansana rasa, Ananda Bhairava Rasa, Tribhuvana Keerti rasa

Parpati Rasayana: Loha parpati, sudha parpati, Rasa Parpati, Sweta Parpati

Kupipakwa Rasayana: Rasasidhura, Rasa karpura

Pottali Rasayana: Tamragarbha pottali, Loha grarbhapottali, Rasagarbha pottali

Learning Outcome

At the end of this chapter, Students can able to

1. Describe importance and unique features of Chaturvidha Rasayana - Kharaliya Rasayana, Parpati Rasayana, Kupipakwa Rasayana & Pottali Rasayana.
2. Explain definition, types and method of preparation of Chaturvidha Rasayana.
3. Explain shelf-life of Chaturvidha Rasayana.

Introduction

After Proper shodhana, Parada will get rid of its doshas, but it will be having gurutva and chapalatva qualities which will make it not suitable for therapeutic purposes. So Parada should be subjected to the process Murchana, by which Parada is converted into such a form that it develops a definite disease curing capacity through various pharmaceutical process with or without Gandhaka.

There are numerous formulations of Parada which are mentioned in our classics. These can be broadly classified into 2 types:

1. **Sagandha-** These are the formulations which includes sulphur. These are many in numbers and safe for use.
2. **Nirgandha-** These are the formulations which does not includes sulphur. They are less in number and comparatively not much safer, so strict pathyas should be followed during their usage.

Classification of Rasaushadhi

Depending upon the method of preparations, Rasoushadhis containing Parada are of 4 Types:

Rasaushadhis

Khalviya Rasayana	Parpati Kalpana	Kupi pakwa Rasayana	Pottali Rasayana
Ex: Kajjali	Ex: Rasa parpati	Ex: Rasa sindura	Ex Rasa pottali
Ananda bhairva Rasa	Gagana parpati	Rasa karpoora	Hema garbha Pottali

1. Khalvi Rasayana

Literally Khalva means 'a mill or stone for grinding drugs' and Rasayana means 'A medicine supposed to prevent old age and prolong life'. So Khalvi Raayanas are the specially designed medicines prepared by grinding in khalva yantra, which prevents old age, prolongs life and cures the diseases.

Khalvi Rasayana is Niragni type of Parada Murchana. Among the major four types of rasoushadhis namely, Khalvi Rasayana, Parpati Kalpana, Kupi pakwa Rasayana and pottali Rasayana, Khalvi Rasayana is the primary and essential pharmaceutical technique as these are the base for the preparation of other 3 Rasayanas. Majority of the khalvi Rasayanas contains Parada as their ingredients. A few are exceptions, which does not contain Parada (Ex. Kapha Ketu Rasa), but still the name is due to the action similar to mercury containing Rasayanas.

Method of Preparation

Necessary Equipment

Khalva Yantra

Procedure

- Some Khalvi Rasayanas contains only mineral drugs (Ex. Kajjali) and some contains both mineral and herbal drugs (Ex. Swasa Bhairava Rasa).
- The ingredients of Khalvi Rasayana are first subjected for purification by specific methods.
- Purified minerals and herbal drugs are made into fine powder and added to Parada and mixed thoroughly to form an homogenous mixture.
- The mixture is triturated with swarasa and kashayas of different drugs, whereby the preparations are properly bounded and become more potent.
- Later, vatis of desired size are prepared and dried or the final product is dried, powdered and stored for further use.

Importance of Khalvi Rasayanas

- Various excellent results are seen when these Khalvi Rasayanas are used with different Anupanas.

- They are easy for the preparation and have wide application in their therapeutic utility.
- The specialty of Khalvi Rasayana lies in binding different varieties of drugs into a single molecular form and thereby minimising the dose and more efficacious in their action.
- Trituration reduces the particle size of the drugs, thereby increases their bio-availability.
- Kajjali used in Khalvi Rasayanas are good yogavahi, it helps the drugs mixed with it to reach the target tissue, also into deeper and most inaccessible parts of the system.
- Addition of Kajjali with herbal drugs in Khalvi Rasayanas increases their shelf life period by its anti microbial property.
- Khalvi Rasayanas promote different secretary organs and endocrine glands and build up all body tissues. The thorough trituration facilitates to fulfil these objectives.

Shelf life

- According to Sharangadhara- Infinite
- As per CCRAS,

  Gutika/Vati containing Kasthaushadhi along with Rasaoushadhis- 5 years

  Gutika or Vati containing Rasaoushadhis- 10 years

Example

Shwasakuthara Rasa

रसो गन्धो विषं चैव टङ्कणं च मनःशिला। एतानि टङ्कमात्राणि मरिचं चाष्टटङ्कम्।।
एकैकं मरिचं दत्वा खल्वे सूक्ष्मं विमर्दयेत्। त्रिकटु टङ्कमात्रं च दत्वा पश्चाद्विचूर्णयेत्।।
सर्वमेकत्र संयोज्य काचकूप्यां विनिक्षिपेत्। कासे श्वासे च मन्दाग्नौ वातश्लेष्मामयेषु च।।
गुञ्जामात्रं प्रदातव्यं पर्णखण्डेन धीमता। सन्निपाते च मूर्च्छायामपस्मारे तथा पुनः।।
अतिमोहत्वमापन्ने नस्यं दत्त्वा विचक्षणः। रसः श्वासकुठारोऽयं सर्वश्वासविकारहा।। (Y.R. Shwasachikitsa)

Ingredients

1.	Rasa (Shuddha Parada)	1 Tanka (4 g)
2.	Gandha (Shuddha Gandhaka)	1 Tanka (4 g)
3.	Visha (Shuddha Vatsanabha)	1 Tanka (4 g)
4.	Shuddha Tankana	1 Tanka (4 g)
5.	Shuddha Manashila	1 Tanka (4 g)
6.	Maricha	8 Tanka (36 g)

7.	Shunti	1 Tanka (4 g)
8.	Pippali	1 Tanka (4 g)
9.	Maricha	1 Tanka (4 g)

Manufacturing Process

1. Purified Parada and Gandhaka are mixed and triturated to make kajjali, then fine powder of remaining ingredients are added one after the other.
2. All the ingredients are mixed well to form homogeneous mixture and preserved in suitable air tight container.

Dose: 1-2 Ratti (125 - 250 mg).

Anupana: Honey.

Important Therapeutic Uses

Agnimandya, Kasa, Shwasa, Vata Kaphaja Roga, Sannipata Roga, Murccha, Apasmara, Meha.

Vatavidhvamsana Rasa

रसं गन्धकं नागवङ्गं च लौहं तथा ताम्रजं व्योम निश्चन्द्रिकं च।
कणा टङ्कणं त्र्यूषणं नागरं वै पृथग्भागमेकं विमर्द्यैकयामम्।।
ततो वत्सनाभं चतुःसार्धभागं दृढं मर्दयेद् भावना व्योषजात् त्रिः।
वराचित्रकैर्मार्कवैः कुष्ठजाद्यिस्त्रिभिर्भावयेन्निर्गुण्डी भानुदग्धैः।।
महीधात्रिकाचन्द्रिकानिम्बुनीरैः समं भावयेद्वातविध्वंसनोऽयम्।
समीरे च शूले महाश्लेष्मरोगे ग्रहण्यां तथा सन्निपाते च सर्वे।
स्त्रियाः सूतिकावातरोगेषु दद्यान्निषेवेत गुञ्जाद्वयं सूतमेनम्।। (Y.R. Vatavyadhichikitsa)

Ingredients

1.	Shuddha Rasa (Parada)	1 Part
2.	Shuddha Gandhaka	1 Part
3.	Naga Bhasma	1 Part
4.	Vanga Bhasma	1 Part
5.	Loha Bhasma	1 Part
6.	Tamra Bhasma	1 Part
7.	Nischandra Vyoma (Abhraka) bhasma	1 Part
8.	Kana (Pippali)	1 Part
9.	Shuddha Tankana	1 Part
10.	Shunti	1 Part
11.	Maricha	1 Part

12.	Pippali	1 Part
13.	Nagara (Shunti)	1 Part
14.	Shuddha Vatsanabha	4 ½ Parts
15.	Vyosha Kwatha	Q.S. (for Bhavana) 3 times
16.	Vara Kwatha	Q.S. (for Bhavana) 3 times
17.	Chitraka Rasa	Q.S. (for Bhavana) 3 times
18.	Markava (Bhrngaraja) Rasa	Q.S. (for Bhavana) 3 times
19.	Kushta Rasa	Q.S. (for Bhavana) 3 times
20.	Nirgundi Rasa	Q.S. (for Bhavana) 3 times
21.	Bhanu (Arka) Rasa	Q.S. (for Bhavana) 3 times
22.	Mahidhatrika Rasa	Q.S. (for Bhavana) 3 times
23.	Chandrika (Chandrasura) Neera	Q.S. (for Bhavana) 3 times
24.	Nimbu Neera	Q.S. (for Bhavana) 3 times

Manufacturing Process

1. Purified Parada and Gandhaka are mixed and triturated to make kajjali, then all the bhasmas and fine powder of remaining ingredients are added.
2. All the ingredients are mixed well to form homogeneous mixture and bhavana of the mixture is done with sufficient quantity of bhavana dravas mentioned in the Sl.No. 15-24 for 3 times in each dravas one after the other.
3. Vatis are Prepared of the size of 2 Gunja, dried in shade and preserved.

Dose: 2 Ratti (250 mg).

Anupana: Honey.

Important Therapeutic Uses

Vataja Shula, Vataja Grahani, Kapharoga, Sutika Vata, Grahani, Sannipata Roga.

Ananda Bhairava Rasa

(A.F.I. - I, Rasayoga, 20/3)

हिंगुलञ्च विषं व्योषं मरिचं टङ्कणं कणा। जातीकोषसमं चूर्णं जम्बीरद्रवमर्दितम्।
रक्तिमानां वटीं कुर्यात् खादेदार्द्रकसंयुताम्। वटीद्वयं त्रयं वाऽपि सन्निपाते सुदारुणे।।
ज्वरमष्टविधं हन्ति तथाऽतीसारनाशनः। जीर्णज्वरहरश्चैव तथा सर्वाङ्गभेदकः।
आमवातादिरोगान् च नाशयेदविकल्पतः।। (R.S.S, Jwaradhikara 2/103-105)

Ingredients

1.	Purified Hingula	1 part

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2.	Purified Vatsanabha	1 part
3.	Purified Tankana	1 part
4.	Jatikosha (Jatiphala)	1 part
5.	Sunthi	1 part
6.	Maricha	2 parts
7.	Pippali	2 parts
8.	Juice of Jambira (lemon)	Quantity required

Manufacturing Process

1. Fine powder of purified hingula and purified gandhaka is made and mixed with the remaining drugs.
2. Powders of equal parts each of the purified hingula, purified vatsanabha (root), purified tankana, purified gandhaka, sunthi, marica and pippali are taken and mixed.
3. Mixture is impregnated by juice of jambira (lemon) and triturated the mixture for six hours.
4. After that the mixture can be rolled into pills and should be retained in shade for drying.

Dose

250 mg

Anupana:

Ardraka Swarasa, Honey

Important Therapeutic Uses

Jvara, Jvaratisara, Amavata, Sannipata Jvara, Asmari, Prameha, Mutrakrucchra

Tribhuvana Keerti Rasa

A.F.I- I, Rasayoga, 20:20,

हिङ्गुलं च विषं व्योषं टङ्कणं मागधीशिफाम्। सञ्चूर्ण्य भावयेत्रिधा सुरसार्द्रकहेमभिः॥८०॥
निर्गुण्डीस्वरसेनापि रसस्त्रैलोक्यकीर्तिकः। विनाशयेज्ज्वरान्सर्वाननुपानविशेषतः॥८१॥ (Rasamrita 9/80-81)

Ingredients

Shuddha Hingula	1 Part
Shuddha Vatsanabha	1 Part
Shunti	1 Part
Maricha	1 Part

CHAPTER TWELVE

Pippali	1 Part
Shuddha Tankana	1 Part
Pippali	1 Part
Tulasi swarasa	Quantity required for 3 Bhavanas
Ardraka swarasa	Quantity required for 3 Bhavanas
Dattura swarasa	Quantity required for 3 Bhavanas
Nirgundi swarasa	Quantity required for 3 Bhavanas

Method of Preparation

1. Fine powder of all the ingredients are taken in Khalva and mixed well to form homogeneous mixture.
2. Tulasi swarasa is added to it and subjected to bhavana for 3 times.
3. Later Ardraka swarasa Dattura swarasa and Nirgundi swarasa are added one after the other and subjected for 3 bhavanas in each liquid and vatis of 1 Ratti pramana are prepared.
4. Vatis are dried in shade and stored in suitable container.
5. As this preparation is famous in all the 3 lokas, it has been named are Tribhuvana keerti rasa.

Dose: 1 - 2 Ratti (125 to 250 mg)

Anupana: Madhu, Ardraka Rasa, Tulasi Rasa

Therapeutic Indications

Vata Kapha Jvara, Sannipata Jvara, Taruna Jvara

2. Parpati Rasayana

The word 'Parpati' is derived from the word 'Parpata', which means papad or a thin wafer. So Parpati kalapana indicates a preparation which is thin, brittle and has a shape of thin crisp wafer. Parpati Kalpana is one among the Rasa bandhas which help to remove chanchalatva and durgrahatva of mercury and makes it free from all sorts of doshas and enhance its potency.

Definition

हुतकज्जलिका मोचापत्रके चिपिटीकृता। स पोटः पर्पटी सैव बालाद्यखिलरोगनुत्।। (R.R.S.11/72)

The Kajjali prepared from shuddha Parada and Gandhaka is heated till it melts, then immediately poured on the banana leaf and compressed to form crisp, thin wafer, which is known as Parpati or Pota Bandha. The Parpati is to be used right from pediatric to geriatric patients so as to cure all diseases.

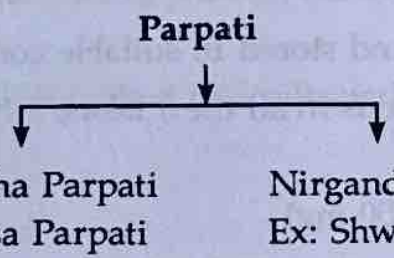
History

Chakrapani datta (11th Century C.E.) was the first author to describe Parpati Kalpa in Grahaniroga. The Parpati mentioned by author consists of Parada and Gandhaka and has been named as "Rasa Parpati". In Rasendra mangala, there is a reference of Parpati which is prepared by parada, Gandhaka, Tamra and Visha indicated in Kushta. But there is uncertainity regarding the author of this text. It is claimed that the author of this text is Acharya Nagarajuna. If it is true, then the first reference of the parpati trace back to 8th century.

In subsequent periods many types of parpatis such as Tamra Parpati (Rasa Prakasha Sudhakara), Panchamrita Parpati (Rasendra Sara Sangraha), Swarna Parpati (Rasa Paddhati), Louha Parpati (Rasa Paddhati), Vijaya Parpati (Bhaishajya Ratnavali) etc., were developed by different scholars by adding one or the other ingredients like Swarna, Rajata, Loha, Tamra, Abhraka, Ratnas etc.

Types

Based on the Ingredients, Parpati is of 2 types:



1. **Sagandha Parpati:** In this type, Parada and Gandhaka are the main ingredients. Along with Parada and Gandhaka, other drugs like swarna, Abhraka etc., are added to prepare different types of Parpati.
   Ex : Rasa Parpati, Swarna Parpati, Vyoma Parpati etc.,
2. **Nirgandha Parpati:** In this type, Parada and Gandhaka are not used as ingredients, but procedure and preparation is similar to that of Parpati.
   Ex : Shweta Parpati and Malla Parpati etc.

Method of Preparation

Necessary Equipment

Khalwa yantra, Loha darvi, spoon, heating device, Gomaya, Kadali patra, plate, Sneha, Ushna jala.

Procedure

- The ingredients specified for particular Parpati kalpas are first subjected for purification by specific methods.
- Purified Parada and Gandhaka are mixed and triturated to make kajjali, then other ingredients are added, mixed well to form homogeneous mixture.

- Small quantity of ghee is taken in loha darvi, heated till it melts and some amount of above mixture is added to the darvi and heated in low flame till it melts.
- Melted mixture is poured on the plaintain leaf which is smeared with the ghee and placed over the platform of cowdung.
- Immediately another ghrta lipta plaintain leaf placed over it and pressed to attain the consistency of parpati.
- After self cooling, parpati is collected in between the plantain leaves, washed with warm water and dried.

Parpati Pakas

मृदुर्मध्यः खरश्चेति पाकोऽत्र त्रिविधः स्मृतः। आद्यौ प्रयोजयेद्वैद्यः खरन्तु विषवत्त्यजेत्।। (R.T.6/138)

Three types of Parpati Kalpana have been explained based on the amount of heat given to the final product, they are Mrudu paka, Madhyama Paka, Khara Paka.

Characteristics of Different Pakas of Parpati

मृदुपाके न भङ्गः स्यात्तत्सारल्यञ्च मध्यमे। द्वयोः सचन्द्रिकं काण्यं खरे चूर्णञ्च लोहितम्।। (R.T.6/139)

1. Mrudu Paka

The Characteristics of Parpati of Mrudu Paka are:

- During Paka, the melted kajjali resembles the colour of Mayura panka.

  मयूरचन्द्रिकाकारं लिङ्गं यत्र तु दृश्यते। (B.R.8/413)
- After the preparation, Parpati remains soft.
- It will not break, it bends and does not produce any crackling sound.
- It will be black in colour and lustourless.
- Ex: Vijaya parpati.

2. Madhyama Paka

The Characteristics of Parpati of Madhyama Paka are:

- During Paka, the melted kajjali resembles the taila.

  निर्धूमबदरकाष्ठाङ्गारे न्यस्तं विलाप्य तैलसमम्। (B.R.8/411)
- The end product Parpati is crispy and breaks with crackling sound.
- Edges when broken are shining.
- Parpati is blackish colour.
- Possesses rich medicinal properties. This is best for therapeutic administration.
- Ex: Tamra Parpati.

3. Khara Paka

The characteristics of Parpati of khara paka are:

- During Paka, the melted kajjali is continued to heat till it becomes red colour.

रक्तवर्णं भवेद्यावत्तावत्पाच्यं प्रचालयेत्। (R.Y.S. II Part; Preparation no. 188)

- Parpati formed will be dry and coarse powder in nature.
- It will be reddish in colour.
- It is heavy to digest.
- This is not recommended for medicinal use, hence should reject just like visha.
- Ex: Rudra parpati.

Dose

गुञ्जाद्वितयमेवादो मात्रामस्य प्रकल्पयेत्। क्रमवृद्धया च वितरेद् गुञ्जादशकमन्ततः।। (R.T.6/143)

In samanya prayoga, Parpati can be administered in the dose of 2 ratti (250 mg) for 2 - 3 times a day.

In kalpa prayoga, parpati is administered starting from the low dose of 1 ratti, increased gradually (by 1 ratti daily) and can administer upto 10 ratti and tappered gradually after symptoms are subsided. During kalpa prayoga, strict pathya should be followed, only dugdha ahara is recommended.

Pathyas during the administration of parpati are : Kakamachi, patola, poogaphala, Ardraka, vastuka, kadali puspa, vatinga, old and dewormed shali, sugar mixed milk, Lavaka-Tittira pakshi mamsa rasa, if thirsty, tender coconut water in little quantity.

Apathya

नाम्लं स्नानं शिशिरसलिलैर्नापि वातदिसेवां कोपं चिन्तामहिममतुलं नैव सेवेत चोष्णम्।
तिक्तं निम्बादिकमिह गुडानूपमांसादिकञ्च स्त्रीणां सम्भाषणमपि बुधैर्नैव कार्यं कदाचित्।। (R.T. 6/161)

Apathya during the administration of parpati are : Amla rasa, sheetajala snana, Sheetavata sevana, Kopa, Chinta and ushna dravya sevana, tikta dravyas like Nimba and others, Guda, Anupa mamsa rasa, Conversation with Sthree in privacy.

Importance of Parpati Kalpas

- Generally Parpati kalpas are ushna veerya, stimulates the agni and mitigates ama. So they are commonly used in Amaja vyadhis of G. I. disorders.
- Some studies reveals that Parpati reduces intestinal motility and increases absorption power of the gut. So this preparations are mainly indicated in Grahani and Atisara.
- This type of preparation are designed in a manner that they are absorbed and acted upon the intestines rather than the stomach, thus preventing the action of gastric juice over it.

Shelf life:

According to Sharangadhara- Infinite

As per CCRAS - 10 years

Example:

Loha Parpati

(B.R., Grahanirogadhikara : 444-453)

Ingredients

1. Shuddha Parada	1 part
2. Shuddha Gandhaka	1 part
3. Loha bhasma	1 part

Method of Preparation

1. Take purified Parada and Gandhaka, mix them and triturate to make kajjali, then add Lauha bhasma, triturate well to form homogeneous mixture.
2. Take the mixture in loha darvi and heat in low flame till it melts.
3. Pour the melted mixture on the plaintain leaf and press with another plaintain leaf to get the consistency of Parpati.
4. Later wash the parpati with warm water and dry it.
5. Triturate the Parpati in Khalva yantra to make it fine powder and store it in suitable glass container.

Dose

It has to be started with 1 Ratti (125 mg) and increased 1 Ratti on each day for 1 week or 2 weeks.

Anupana: Dhanyaka or Jeeraka Hima or kwatha.

Pathya-Apathya

Pathya: Rakta shali, butter milk, Jeeraka

Apathya: Shaka varga, Vidahi ahara, Atapa sevana, Vata prakopa Ahara- Vihara, Chinta, Maithuna.

Time of Administration

After nitya karma, this parpati has to be taken early in the morning in empty stomach

Therapeutic Indications

Sootika roga, Jwara, asadhya Grahani, Amadoshaja shoola, Atisara, Pandu, Kamala, Pleehavrddhi, Agnimandya, Bhasmaka roga, Amavata, Udavarta, all types of Kushta and different types of Visha.

Sudha Parpati

(Rasamrita 5th chap- Sudha vignaniyam)

Ingredients

1.	Sudha	1 Part
2.	Shuddha Gandhaka	2 Parts

Manufacturing Process

1. Take the ingredients in Khalwa yantra, mix well to form homogeneous mixture.
2. Mixture is heated in low flame till it melts.
3. Pour the melted mixture on the Plaintain leaf and press with another plaintain leaf to get the consistency of Parpati.
4. Later wash the parpati with warm water and dry it.
5. Triturate the Parpati in Khalva yantra to make it fine powder and store it in suitable glass container.

Dose: 1-2 ratti (125-250 mg).

Anupana: Water, Milk.

Important Therapeutic Uses

Pimples, Kantamala, Prameha pidika, Twak rogas

Rasa Parpati

(A.F.I. - I, Parpati, 16:3)

शुद्धे सूते शोधितगन्धकचूर्णेन तुल्यता कार्या। तावन्मर्दनमनयोर्यावन्न कणोऽपि दृश्यते सूते।।
पश्चात्कज्जलसदृशं चूर्णं लौहीस्थितं प्रयत्नेन। निर्धूमबदरकाष्ठाङ्गारे न्यस्तं विलाप्य तैलसमम्।।
सद्योगोमयनिहिते कदलदले ढालयेन्मृदुनि। लौहीस्थितमवशिष्टं कठिनं तन्न गृहीतव्यम्।।
पश्चात्पर्पटिरूपा पर्पटिका कीर्त्यते लोकैः। अर्शोरोगं ग्रहणीं सामां शूलातिसारौ च।।
कामलपाण्डुव्याधिं प्लीहानञ्चातिदारुणं हन्ति। गुल्मजलोदरभस्मकरोगं हन्त्यामवातांश्च।।
अष्टादशैव कुष्ठान्यशेषशोथादिरोगांश्च। इयमम्लपित्तशमनी त्रिदोषदमनी क्षुधातिकमनीया।।
अग्निं निमग्नमुदरे ज्वालाजटिलं करोत्याशु। रसगन्धकपर्पटिका स्वपवार्यव्याधिसङ्घातम्।।
वलीपलितशून्यं पुरुषं दीर्घायुषं कुरुते। व्याधिप्रभावहरणादपमृत्युत्रासनाशकरणाच्च।।
मर्त्यानाममृतवटी रसगन्धकपर्पटी जयति। (B.R. Grahanirogadhikara 414-416 & 436-440)

Ingredients

1. Shuddha Parada	1 part
2. Shuddha Gandhaka	1 part

Method of Preparation

1. Take purified Parada and Gandhaka, mix them and triturate to make kajjali.

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2. Take the kajjali in lohadarvi and heat in low flame till it melts.
3. Pour the melted mixture on the plaintain leaf and press with another plaintain leaf to get the consistency of Parpati.
4. Later wash the parpati with warm water and dry it.
5. Triturate the Parpati in Khalva yantra to make it fine powder and store it in suitable glass container.

Dose: 2 ratti (250 mg), may be increased gradually upto 1125 mg.

Anupana: Milk, Butter milk, Bharjita Jeeraka Churna, Hingu Churna.

Pathya-Apathya

Pathya: Milk, butter milk, Jeeraka Kvatha.

Apathya: Water, salt.

Therapeutic Indications

Shoola, Grahani, Atisara, Pravahika, Gulma, shotha, Kamala, Pandu, Jvara, Amavata, Arsha, Kushta, Amadosha, Pleeha, Jalodara, Bhasmakaroga, Amlapitta.

Shweta Parpati

(A.F.I. - II, Parpati, 12:2)

Siddhayogasangraha, Ashmari mutrakrcchra dhikara.

Ingredients

1.	Kalmi sora (Soraka/Suryakshara)	16 Parts
2.	Phitakari (Sphatika)	2 Parts
3.	Nausadara (Narasara)	1 Part

Manufacturing Process

1. Take the ingredients in Khalwa yantra, mix well to form homogeneous mixture.
2. Take the mixture in earthen pot and heat in low flame till it melts.
3. Pour the melted mixture on the Plaintain leaf and press with another plaintain leaf to get the consistency of Parpati.
4. Later wash the parpati with warm water and dry it.
5. Triturate the Parpati in Khalva yantra to make it fine powder and store it in suitable glass container.

Dose: 5- 10 ratti (625-1,250 mg).

Anupana: Sheetajala, Narikela Jala.

Important Therapeutic Uses

Amlapitta, Ashmari, Mutrakrcchra, Mutraghata.

3. Kupi Pakwa Rasayana

Kupi Pakwa Rasayana is one among the Parada preparation, prepared from Parada and other ingredients in a specially designed kupi by applying specific heating schedule by means of Valuka yantra.

कूपी इति काचकूपी-पक्वं अग्निना पक्वं-रसस्य पारदस्य-अयनं स्थानम्।

In Kupi Pakwa Rasayana, the word kupi refers to the specially designed glass bottle; Pakwa means heating in agni (kramagni); Rasa signifies the Parada and Ayana indicates the place.

Definition

कुप्यम् अग्निनां पक्वं यद्रसायनं तत् कूपीपक्वरसायनम्।

Kupi Pakwa Rasayana is a specific preparation where Parada and other dravyas are processed by heating in a specialized glass bottle (kupi) by applying Kramagni Tapa (Mrudu-Madhya-Teevra), which has its own clinical efficacy with minimum therapeutic dosage.

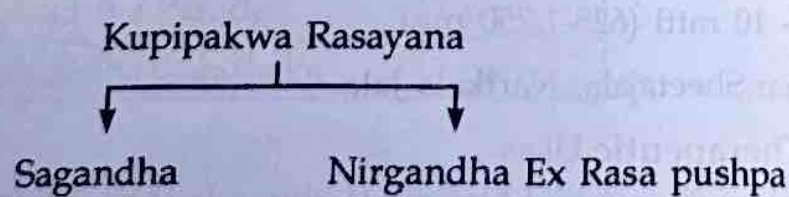
History

There is no reference available regarding Kupi Pakwa Rasayana during Pre-vedic, Vedic and Samhita period. Kupipakwa Rasayana preparations developed from the concept of Gandhaka jarana, which was first described in Rasahridaya tantra by the author Govinda Bhagavatpada in 9th century. And also Acharya Bhairavananda has mentioned the process of Gandhaka jarana in his text Rasarnava.

For the first time, Acharya Yashodhara in his text Rasa Prakasha Sudhakara has explained Kupi pakwa rasayana by the name 'Udaya Bhaskara Rasa' which was prepared by using Kacha kupi and Sikata yantra. He has also explained the method of Rasa Karpoora preparation by the name Ghanasara Rasa. In Rasa chintamani, Acharya Anantha Deva Suri has explained Rasabhasma preparation by Kupi Pakwa Rasayana method. Acharya Madhava in his text, Ayurveda prakasha, described these preparations by the name of Sindura Rasa. Later in Rasa tarangini, Acharya Sadananda Sharma has quoted many formulations of Kupi pakwa rasayanas

Classification of Kupi Pakwa Rasayana

I. On the Basis of Ingredients



Parada + Gandhaka	Parada + Gandhaka + Dhatu	Parada + Gandhaka + Adhatu	Parada + Gandhaka + Adhatu + Swarna
Ex Rasa sindura	Ex: Swarna vanga	Ex: Malla Sindura	Ex: Poorna chandradoya Rasa

Sagandha kupipakwa rasayanas are those which contains Gandhaka along with Parada. Depending upon the other ingredients used along with Parada and Gandhaka, it is again of 4 types. Nirgandha kupipakwa rasayanas are those which does not contain Gandhaka

II. On the Basis of Location of Finished Product:

Galastha/Kantastha	Talastha/Adhastha	Ubhayastha
Ex: Rasa Sindura	Ex Sameera Pannaga Rasa	Rasa Ex: Poorna Chandradoya Rasa

In kupipakwa rasayanas, if the final product gets collected at the neck of the kupi (glass bottle), they are known as Galastha/Kantastha kupipakwa rasayanas. If the final product gets collected at the base of the kupi (glass bottle), they are known as Talastha/Adhastha. If the final product gets collected at both neck and base of the kupi (glass bottle), they are known as Ubhayastha kupipakwa rasayanas.

III. On the Basis of Manufacturing Method:

Antardhooma	Bahirdhooma
Ex: Rasa Sindhura	Ex: Malla Sindhura

During the preparation of Kupipakwa rasayanas, if the corking of the kupi mouth is done initially without letting the fumes to go out of the kupi then it is called Antardhooma. If the corking of the kupi mouth is done after the fumes is allowed to go out of the kupi, such type of preparations are called Bahirdhooma.

Method of Preparation

Necessary Equipment

Kacha kupi, Vastra, Mrittika, Valuka, Valuka yantra, Loha Shalakas, Copper coin, Agnibhatti, Pyrometer.

Procedure

The whole procedure of the preparation of Kupi pakwa rasayana is divided into three steps:

- Purva Karma
- Pradhana Karma
- Paschat Karma.

Purva Karma

Purva karma provides base for the pradhana karma, the following steps are considered in this process.

1. Selection and Purification of Ingredients

- The raw materials specified for the preparation should be identified first for their authenticity and purity.
- All the raw materials should be subjected for purification according to the method prescribed in classics.

2. Preparation of Kajjali

- Here, the term Kajjali is used for pre-material or for the mixture, which is used for making Kupi pakwa rasayana.
- The quantity of Parada and other drugs should be taken according to the reference and trituration should be done in Khalwa yantra without adding any drava till the homogeneous mixture is formed and the mixture becomes lusterless.
- Generally, Kajjali is of black colour but the colour of this pre material depends on the ingredients used. Ex: Rasa pushpa - Ash Colour; Hinguliya Manikya Rasa - Deep orange.
- If Bhavana has mentioned for the preparation, Kajjali should be triturated with specified bhavana drava, then it should be dried and powdered finely.

3. Preparation of Kupi

- Kupi which is used in Valuka yantra should be covered with the 7 layers of mud smeared cloth to make it suitable to withstand intense heat and becomes more pressure resistant.
- Now a days beer bottles of 650 ml capacity with the neck 1" - 1½" length and moderate thickness is used.
- Mud which is pandura, krishna or swetha varna which sustains heat can be used. Valmika mrittika or potter's clay can also be used. Generally, at present multani mitti is used for this purpose.
- The mud smeared cloth is wrapped over the kupi from bottom to mouth and should be well dried after each layer. Likewise 7 such layers are wrapped and dried well.

4. Filling of Kajjali into the Kupi

- The Kupi is to be filled up to ⅓rd with the Kajjali so that there will be enough space inside the Kupi for the reactions happening inside it and also for the

sublimation of compound which is going to be condensed and deposited in the neck of the Kupi.

- Such Kupi should be kept exactly at the centre of Valuka yantra, placed at a height of two Angula from the bottom of Valuka yantra and remaining part of the Valuka yantra should be filled with sand up to the neck of the Kupi.

Pradhana Karma

Pradhana Karma includes heating process. The below steps are to be followed during the process:

1. Heating Pattern and its Monitoring

During the preparation of Kupipakwa rasayanas, heating should be provided in kramagni pattern. A few lakshanas of different heating stages of Kupi Pakwa Rasayanas are mentioned by our Acharyas for deciding proper pachana of the ingredients, through Kramagni paka.

Kramagni Pattern is Categorized into Three Stages

I. Mrudu Agni (125 - 250° C): Stage of Melting of Kajjali

- In this initial stage of heating, Sulphur fumes begins to appear which can be appreciated at the mouth of the Kupi.
- Kajjali inside the Kupi gets melted completely which may be ascertained by inserting Sheeta shalaka in to the Kupi.

II. Madhyamagni (250 - 450°C): Stage of Boiling of Kajjali

- This stage commences from the complete melting of Kajjali and lasts till the starting of formation of Sindura compound.
- In this stage, Liquefied Kajjali starts boiling which can be ascertained by inserting Sheeta shalaka in the Kupi or by visualizing through torch light.
- In this stage, all the characteristics of fumes like colour, odour etc. can be noted which varies based on the ingredients. Colour may be yellowish, orange, bluish or white; odour may be sulphur or arsenical; Quantity may be mild, moderate or profuse.
- Deposition of condensed fumes at the neck of the Kupi may cause chocking, which needs to be removed frequently by inserting Tapta shalaka in to the Kupi mouth.
- After ceasation of fumes, appearance of flame will be observed, whose features also depends on the ingredients used.
- Moderate heat has to be maintained for the prescribed period to ensure burning of extra Sulphur in the product and same degree of heating is maintained till boiling of Kajjali ceases.

III. Teevragni (450 - 650 °C): Stage of Corking of the Mouth of the Kupi

- After the ceasation of fumes and flames and satisfying other tests, corking of the mouth of the kupi should be done.
- The remaining timings specified for the preparation is provided with teevragni and then allowed for swanga sheeta. During this stage, chemical reactions occurs and as a result, new compound is formed which is called as Sindura Kalpa. It sublimates and gets condensed at the neck and mouth of the Kupi.

Different parameters can be used to monitor the temperature during the preparation of Kupi pakwa rasayanas.

Ancient Parameters: Traditionally following Tests were in Practice

- **Cotton, dry grass test:** If the Cotton or dry grass kept on the Valuka catches fire and burns, then the temperature provided is considered as Teevragni.
- **Rice test:** When a Paddy or maize placed over the Valuka puffs up, then that temperature is considered as teevragni.

Modern Parameters: Pyrometer, Thermocouples, Thermometers are used for measuring the temperature.

2. Shalaka Sanchalana

- During the procedure, 2 types shalakas are advised to be used- Hot (Ushna) shalaka and Cold (Sheeta) shalaka.
- Thin rods (0.5 cm) for cold shalaka test and Thick shalaka (1-1.5 cm) for Hot shalaka test are used.
- Cold shalaka is used to know the status of kajjali, whether it is in powder form or molten form, or in boiling state or in sublimation state.
- Hot shalaka is used for burning the sulphur deposited at the neck region of kupi, which may block and ultimately breaks the kupi.

3. Corking of Kupi (Mukhamudrana)

It is important to note the proper time of corking. It is done by observing following findings.

1. Absence of flame.
2. Absence of fumes.
3. Copper coin test- should be positive (If a copper coin is kept over the mouth of kupi/glass bottle, a white deposition is formed on it).
4. Sooryodaya lakshana- positive (Appearance of Redness in the bottom of Kupi).
5. Complete expulsion of water vapours.
6. Dry grass test should be positive.

7. When a Ushna shalaka is inserted into the kupi/glass bottle and removed, it is covered with smoke.
8. Positive Sheeta shalaka test; a confirmatory test before corking (If a Sheeta shalaka is introduced into the Kupi, it gets coated with different colour according to different compounds. Ex. Blackish in Rasa Sindura, White coating in Rasapushpa etc.)

4. Method of Corking

- Before corking, 2-3 inches of sand layer should be moved aside from the neck region to make it cool as the sublimating compound can get well condensed in the neck portion of the Kupi.
- While corking, the temperature is reduced for some time.
- Cork made up of stone or wood or mud is kept over the mouth of the Kupi and then it is covered with the cloth smeared with clay/Multani mitti.

Paschat Karma

Paschat karma includes the following steps

1. Removal and Scraping of Kupi

First sand should be removed from the Valuka yantra and then the Kupi is taken out carefully. Then by scraping, layers of cloth smeared with Gopichandana is removed and kupi should be cleaned with wet cloth, then mark the level of Rasayana inside the neck/bottom.

2. Breaking of Kupi

A kerosene or Spirit dipped thread is tied 2-3 cm away from the level of the product and fire is set. Kupi is kept horizontal and rotated so that whole thread gets completely ignited. After the fire extinguishes, little cold water is sprinkled over it or Kupi can be wrapped with a wet cloth, then the Kupi breaks into 2 equal halves at desired level.

3. Collection and Examination of Product

Kupi Pakwa Rasayana product which may be kantastha or talastha type, should be collected carefully from the particular portion, powdered well and stored. Then the product is analyzed with classical and modern parameters.

Importance of Kupi Pakwa Rasayana

- It is the best Rasayana.
- Potency of these drugs remains longer period.
- It requires minimal dose.
- Easy for administration.
- When mixed with other drugs, it reduces the dose of other drugs.

- It can cure even Asadhya Rogas.
- More potent as compared to other preparations due to its Yogavahitva and Ashukaritva property.
- Chemical bond is more stronger than kajjali and parpati kalpas, so more stable.

Shelf life

According to Sharangadhara- Perpetual

As per CCRAS- 10 years

Example

Rasa Sindura

(A.F.I. - I, Kupipakwa Rasayana, 15:6)

तोलकाष्टकमितं रसेश्वरं तन्मितञ्च विमलं बलिं हरेत्।
खल्वके खलु विमर्द्य कज्जलीं भावयेदथ वटाङ्कुराम्बुभिः।।
मषीपात्रसमाकारां सुकृष्णां काचकूपीकाम्। सतूलकुट्टितमृदा लेपयेत् खलु यत्नतः।।
स्थापयेत्कज्जलीं काचकुप्यां ततो यत्नतः पाचयेद्वालुकायन्त्रगाम्।
अग्निवृद्धिक्रमैर्जीर्णगन्धे रसे रोधयेद्युक्तितः काचकूपीमुखम्।।
बालुकायन्त्रके काचकूपीमुखात् रोचनासन्निभो नैति धूमो यदा।
सूतपाकक्रियाज्ञानदक्षैर्बुधैर्वेदितव्यस्तदा जीर्णगन्धो रसः।।
निवेश्य कुप्यां खटिकाविधानं जलेन सम्पेषितया प्रकामम्।। (R.T. 6/162-176)

Ingredients

1.	Shuddha Parada	8 tola (96 gms)
2.	Shuddha Gandhaka	8 tola (96 gms)
3.	Vatankura Swarasa	Quantity required

Method of Preparation

1. Shuddha Parada and Shuddha Gandhaka are taken, mixed and triturated to make uniform amalgam.
2. Then the Kajjali is subjected to bhavana with Vatankura swarasa and dried it.
3. This Kajjali is filled in Kacha kupi and heated in Valuka yantra in Kramagni (Mrudu, Madhyama and Teekshna agni).
4. General Pharmaceutical procedure of Kupipakva Rasayana is followed, bottle is corked after the Gandhaka jeerna and after the fumes stops.
5. Heating is continued till the specified time and at the end, the product which is red in colour is obtained.
6. This is the Kantastha Kupipakwa Rasayana, so the product is collected from the neck portion and preserved in an airtight glass container.

Dosage

1 Ratti (125 mg)

Anupana

Honey

Therapeutic Indications

Kaphaja Roga, Balakshaya, Dhatu Kshaya, Hrddaurbalya, Prameha, Shoola, Bhagandara, Shotha, Gulma, Rajayakshma, Pandu, Sthoulya, Vrana, Mandagni, Sannipata Jwara, Agnimandya, Aruchi and many other diseases with different anupanas.

Rasa Karpoora

पलसंमितं प्रयत्नाद्विमलीकृतं रसेशम्। सपलार्द्धकं पलैकं विमलं च गन्धकाम्लम्।।
चषकोपमेविशुद्धं निदधीत काचपात्रे। विनिधाय काचपात्रं त्वयसस्त्रिपादिकायाम्।।
ज्वलिते सुराप्रदीपे संशोषयेज्जलांशम्। अथ शोषिते तु चूर्णं त्ववतार्य वै प्रदीपात्।।
समभागिकं च दद्याल्लवणं तु सैन्यवाख्यम्। परिमैल्य चूर्णमेतत्रिदधीतं काचकुप्याम्।।
युगसंख्यकैस्तु यामैः सिकताख्ययन्त्रसंस्थम्। विपचेदतिप्रयत्नात् रसतन्त्रकर्मविज्ञः।।
अवबुध्यकाचकूपींस्वतएवशीतलाङ्गीम्। घनसारनामधेयंरसमाहरेद्रसज्ञः।।
जलीयबाष्पे निर्यति पिधानेन पिधापयेत्। कूपीकण्ठस्थितां स्वल्पां सिकताञ्चापसारयेत्।। (R. T.6/65-71)

Ingredients

1.	Shuddha Parada	1 pala (48 gms)
2.	Gandhakamla (H_2SO_4)	1.5 pala (72 gms)
3.	Saindava lavana	1 pala (48 gms)

Method of Preparation

Dosage

आरम्भर क्तिकायास्तु चतुःषष्ट्यंशतो भिषक्। द्वात्रिंशद्भागपर्यन्तं मात्रामस्य प्रयोजयेत्।। (R. T.6/76)

1/64 Ratti- 1/32 ratti (1.9- 3.9 mg)

Anupana

Honey

Therapeutic Indications

रसकर्पूरकं ख्यातो बहुभूतविषापहः। त्वग्रक्तदोषशमनो ग्राही रुधिविवर्द्धनः।।
अतीसार प्रशमनोविशेषात्कृमिनाशनः। प्रवाहिकाहरः कामं मात्राधिक्ये विषक्रियः।।
स्फोटं कण्डूमपि च चिरजां मण्डलादींश्च कुष्ठान्। सर्वोत्थं वा सहजमपि वा स्पर्शजं वा फिरङ्गम्।
शीघ्रं नानाव्रणगणभवां हन्ति पीडां महोग्रां कर्पूराख्यो जठरदहनोद्दीपनोऽयं रसेशः।।
शीतले षोडशगुणे सलिले विनिपातितः। सर्वथा द्रवतां याति रसः कर्पूरकाभिधः।। (R. T.6/72-75)

4. Pottali Rasayana

Parada is a core element of Rasashastra and plays an important role in Rasayogas.

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It brings more qualities in the formulations and exhibits different therapeutic merits after undergoing murchana with different pharmaceutical preparations (Khalveeya rasayana, Parpati rasyana, Kupipakwa rasayana and Pottali rasyana). Among the 4 types of Rasayanas, pottali rasayana is unique in terms of its preparation, mode of administration, quick in action, less dose and easy for transportation.

Etymology

The word pottali is derived from the word Puta.

Puta

पुट संश्लेषणे तुदादिः पुट संसर्गे-पुटयति तुदादि (S.K.D)

The word puta refers to sanslesha which means adhesion or to give support; also puta word refers to sansarga which applies to association, combination. Another derivation states that the word puta applied to minimize, to concise or to make compact.

Pottali

पाट्टलि-स्त्री, पोटेन संश्लेषण लीयते इति। ङीप् पूट्टलिका -वस्त्रबद्ध द्रव्यम्। पुटुलि इति भाषा।

The meaning of pottali refers- To concise, To compact a substance, To minimize a substance, Making into bundle, pocket of the substances or to put different substances into a bundle or pocket which means similar in case of pottali kalpana.

Definition

विस्तरितस्य वस्तुनः अल्पो भवनम् पोट्टम्। पोट्टलाति गृहणाति इति पोट्टलि।। (P. V. page 168)

Pottali can be defined as to collect scattered materials, into a compact and comprehensive size. It is the technique or processing which gives compactness to the scattered materials.

History of Pottali

There are no references of pottali kalpanas available before the period of Rasashastra. But pottali word was used for different purposes in Ayurvedic literature like bundling the various herbal drugs by a piece of cloth and to apply for sudation in various diseases, in nasya karma, in netra kalpas etc. All these references infer Pottali is a structure that keeps resemblance with a pouch having some herbal or other drugs in it. But from the point of Rasa shastra, Pottali kalpana is a unique formulation of metallo-mineral drugs evolved in order to keep multiple components like Bhasma, Dhatu, Ratna etc., into a compactly processed one.

The first mentioning regarding Pottali kalpana is found in Rasa Ratnakara, text of 12th Century A.D., where the author Nityanatha mentioned 2 pottali kalpas which are prepared by putapaka method. The text Rasa Prakasha Sudhakara of 13th century A.D. has mentioned the preparation of Pottali by Gandhaka drava paka in the context of Vajra Pottali. In 14th century A.D., the author of Rasa chintamani has mentioned 6

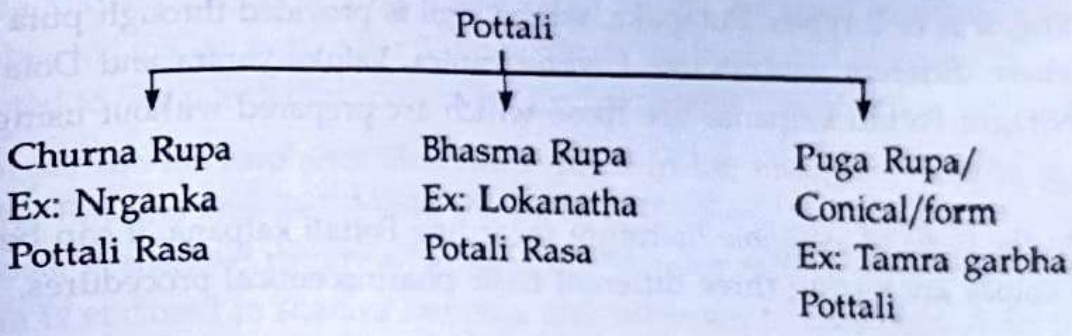
Pottali kalpas, among which he had mentioned first time the method of preparation of Hiranya garbha Pottali in dola yantra with molten sulphur.

In 18th century, the author of Yogaratnakara has mentioned Gandhaka drava paka in an iron vessel. Bhava Prakasha mentioned Shankha garbha Pottali in Atisara adhikarana by kaparda poorana and subjecting to Puta paka. Later, most of the Rasa classical texts of 19th and 20th century have just recompiled some Pottali yogas from previous authors and some have added few new Pottali kalpas to the existing kalpas.

Classification of Pottali

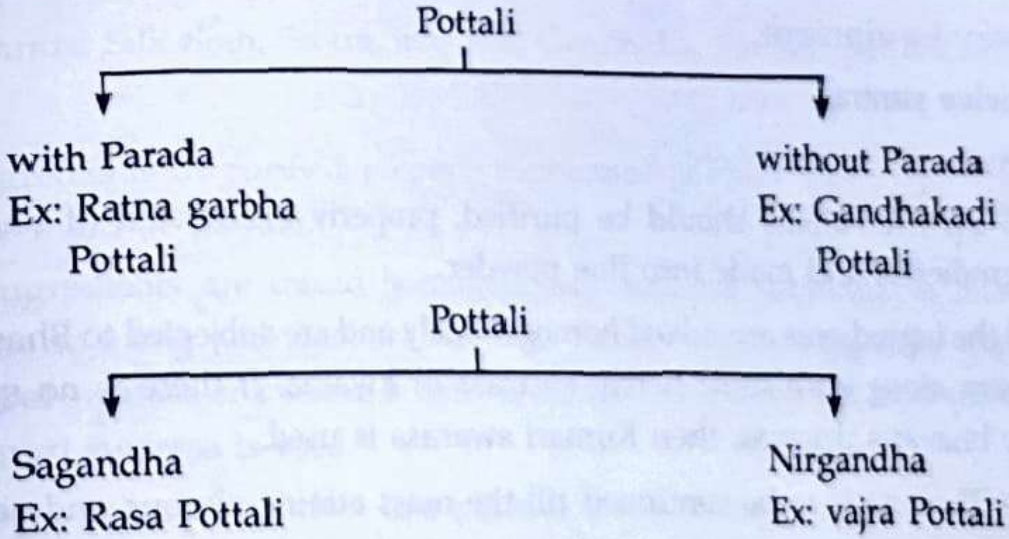
For the better understanding, Various Pottali kalpas can be basically classified as below:-

1. Based on Appearance



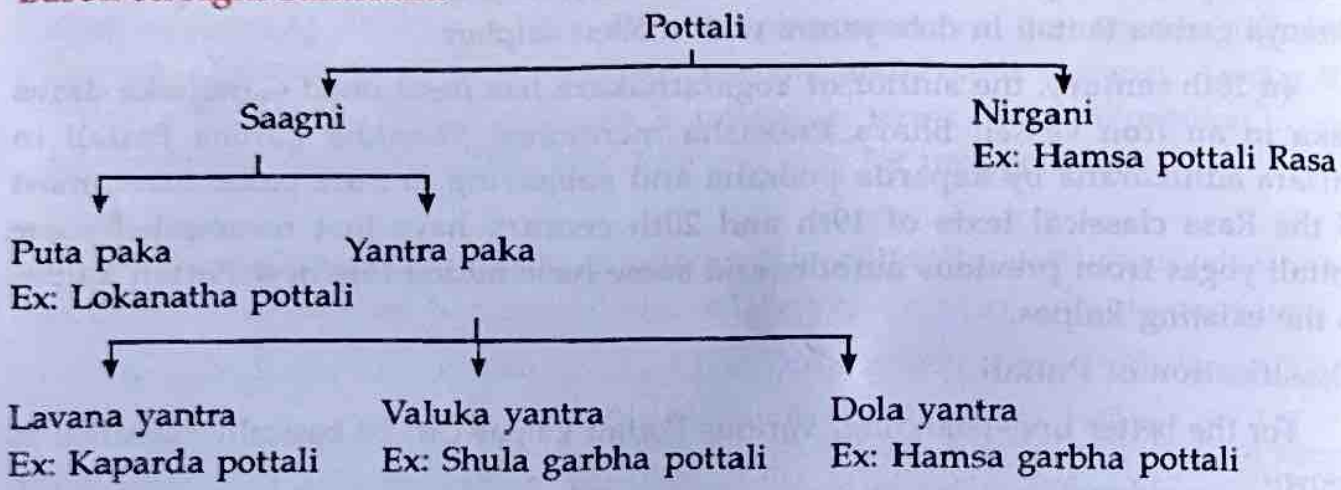
Depending upon the appearance of the final product of the Pottali kalpas, it is of 3 types: Churna rupa (powder form), Bhasma rupa (ash form) and Puga rupa (conical form).

II. Based on Ingredients



Depending upon the ingredients, Pottali kalpas are of 2 types: those with Parada and those without Parada. Again it is of 2 types: Sagandha (with Sulphur) and Nirgandha (without Sulphur)

Based on Agni Samskara



Pottali kalpanas prepared using fire are called Saagni paka. Based on the mode of heating, it is of 2 types: Putapaka, where agni is provided through puta and yantra paka where different yantras like Lavana yantra, Valuka yantra and Dola yantra are used. Niragni Pottali kalpanas are those which are prepared without using fire.

Method of Preparation

On the basis of available literature regarding Pottali kalpana, it can be stated that Pottali kalpas are having three different basic pharmaceutical procedures. They are:

1. Bhavana method
2. Puta Paka method
3. Pottali Paka

1. Bhavana Method

Necessary Equipment

Khalva yantra

Procedure

- All the ingredients should be purified, properly incinerated (if bhasmas are the ingredients) and made into fine powder.
- All the ingredients are mixed homogenously and are subjected to Bhavana in khalva yantra along with some herbal swarasa or kwatha. If there is no specification of any bhavana dravyas, then Kumari swarasa is used.
- The Bhavana is to be continued till the mass attains viscous and semisolid state.
- The procedure is repeated for 3 to 5 times, then the mixture is dried, powdered and preserved.
- Ex: Hamsa Pottali Rasa, Gandhakadi Pottali Rasa

2. Puta Paka Method

Necessary Equipment

Khalva yantra, Kaparda or moosha prepared from the Shankha Bhasma, Tankana, Goksheera, Sharava, Sealing material like Mrutlepita vastra, Vanopalas, Gajaputa pit

Procedure

- All the ingredients of Pottali viz., Sindhura, Dhatu, Bhasmas, Choorna etc., are subjecting to puta paka by a specialized technique and reduced to bhasma form.
- First, all the ingredients are subjected to bhavana with suitable herbal drava as per the classical reference and is allowed to dry.
- This mixture in fine powder form is filled in the kaparda and its ventral cleft is closed with the paste made of Tankana and Cow's milk. This paste is smeared around kaparda and allowed for drying. These kapardas are enclosed in sharava samputa and subjected to Gaja puta. After Swanga sheeta the burnt and bloomed kaparda are macerated to fine powder and preserved. Ex: Lokanatha Pottali, Ratna garbha Pottali.
- Otherwise, the mixture after Bhavana is filled in the moosha prepared from the Shankha Bhasma and sealed with the paste of Tankana Bhasma and Cow's milk. This paste is smeared thickly all around the Moosha and allowed for drying. This Moosha is enclosed in sharava samputa and subjected to Gaja puta. After Swanga sheeta, the content inside the samputa along with Moosha is macerated into fine powder. Ex : Shankha garbha Pottali.

3. Pottali Paka

Necessary Equipment

Khalva yantra, Silk cloth, Sootra, Iron rod, Gandhaka, Earthen pot, Valuka yantra

Procedure

- All the ingredients are purified, properly incinerated (if bhasmas are the ingredients) and made into fine powder.
- All the ingredients are mixed homogenously and are subjected to Bhavana in khalva yantra along with Babbula Niryasa, Tulasi swarasa, egg yolk, Chitraka or other herbal swarasa or kwatha. If there is no specification of any bhavana dravyas, then Kumari swarasa is used.
- After proper trituration, when fine paste is made, Pottali is prepared. There are different opinions found in the Rasa shastra text regarding the shape of the Pottali. According to Rasayana Sara, the shape must be "Shikhara-arambhika akara" means the base being wide with narrowly pointed towards the top resembling the shape

of the pyramid; Some text mentions the shape as "Pugakara" the Pottali should look like Puga phala (fruit of Araca catechu nut) in shape and size(va.chi.); another text mentions the shape as "karsya manascha vartika" means Pottali should be in the shape of varti and approximately weighing of one karsha (12 grams).

- The pottali is dried and tied in silk cloth from 1 to 4 layers, sulphur powder is to be placed in between each layer. This is suspended using iron shalaka in the earthen pot containing molten sulphur and the container should be smeared with ghee before to the Gandhaka Paka. The author of Yoga Ratnakara mentioned to use Ayasapatra (Iron container) for the same.
- Then the Pottali paka is done by indirect heat application and in mandagni using valuka yantra or such other yantras. Different views are mentioned in Rasa shastra classics regarding the duration of paka of Pottali. They are Yamardha, Yamaka, Ghatika, Dwitayam, Ghatadwaya, Dwiyamam which indicated the duration of paka from 1 hr to 8 hrs.
- But paka should be continued till the attainment of perfect paka lakshanas. The signs mentioned to determine the paka lakshanas are:

a) The paka of Pottali is considered perfect or completed when the color of the sulphur becomes Vyoma varna (sky color) or Neela shyama (Bluish black) varna.

b) Metallic sound is produced by the Pottali when banged against the container or any hard substances.

c) Burning of cloth is observed during the paka

d) The Pottali is taken out after attaining paka lakshanas and the silk cloth is removed. Then the Pottali is scraped with a knife to remove the superficial coating of Gandhaka adhered to it and stored in suitable containers for further therapeutic uses.

Mode of Administration

This Pottali should be rubbed over a rough surfaced stone for desired number of rotations by applying madhu or ghritha as a medium and whole paste is administered orally.

Importance of Pottali Kalpana

- More convenient to handle.
- As Parada is treated with molten sulphur, it becomes therapeutically more efficacious.
- Parada is mixed with other drugs like satwa, bhasma, sindura etc., which enhances its property as well as exhibit synergistic action.
- These kalpanas can be used in emergency conditions.

- Convenient for transportation.
- Easy for administration and dose fixation.
- This type of formulations are designed in such a way that there will be preservation of properties for longer time.

Shelf life

According to Sharangadhara- Perpetual

As per CCRAS- 10 years

Example

Tamragarbha Pottali

(Rasayogsagara dwitiyabhaga pottali rahasya page 581)

Ingredients

1.	Tamra bhasma	10 karsha
2.	Kajjali	1 karsha
3.	Shuddha Gandhaka Churna	1 Tanka
4.	Shuddha Swarna	6 Ratti
5.	Kumari swarasa	Quantity sufficient

Method of Preparation

1. Kajjali and Tamra bhasma are triturated well and subjected to bhavana with Kumari swarasa for 7 days and a pottali of blunt conical shape is prepared.
2. Pottali is dried and tied up in a silk cloth on which sulphur is smeared.
3. Then the Pottali tied in silk cloth is tied with a rod and suspended it in a Dolayantra containing molten sulphur.
4. The dolayantra is heated on a low fire till the sulphur assumes Vyoma varna (slightly bluish colour) and the contents of the Pottali shows the signs of hardness on being tapped upon the wall of the yantra.
5. The Pottali is removed along with the rod and allowed for swanga sheeta.
6. Then carefully the silk cloth wrapped around the pottali is detached and scraped the Pottali cone to remove any encrustation of excess sulphur or cloth and preserved in suitable air tight container.

Dose: ½ - 1 ratti (62.5-125 mg)

Anupana: Ardraka swarasa, Madhu, Roganusara.

Therapeutic Indications

Kaphaja-Tridoshaja Shwasa, Kasa, Jwara, Shoola, Vardhakya, Shosha

Loha Garbha Pottali

(Rasayogsagara dwitiyabhaga pottali rahasya page 581)

Ingredients

1.	Loha bhasma	10 karsha
2.	Kajjali	1 karsha
3.	Shuddha Gandhaka Churna	1 Tanka
4.	Shuddha Swarna	6 Ratti
5.	Kumari swarasa	Quantity sufficient

Method of Preparation

1. Kajjali and Loha bhasma are triturated well and subjected to bhavana with Kumari swarasa for 7 days and a pottali of blunt conical shape is prepared.
2. Pottali is dried and tied up in a silk cloth on which sulphur is smeared.
3. Then the Pottali tied in silk cloth is tied with a rod and suspended it in a Dolayantra containing molten sulphur.
4. The dolayantra is heated on a low fire till the sulphur assumes Vyoma varna (slightly bluish colour) and the contents of the Pottali shows the signs of hardness on being tapped upon the wall of the yantra.
5. The Pottali is removed along with the rod and allowed for swanga sheeta.
6. Then carefully the silk cloth wrapped around the pottali is detached and scraped the Pottali cone to remove any encrustation of excess sulphur or cloth and preserved in suitable air tight container.

Dose: 1-3 ratti (125-375 mg)

Anupana: Ardraka swarasa, Madhu, Roganusara.

Therapeutic Indications

Sangrahani, Pandu, Kamala, Rakta kshobha, Prameha, Pradara

Rasa Garbha Pottali

(Rasayogsagara dwitiyabhaga pottalirahasya page 582)

Ingredients

1.	Darada bhasma	pala
2.	Parada bhasma/Shuddha Parada	1 karsha
3.	Shuddha Gandhaka Churna	1 Tanka
4.	Shuddha Swarna	6 Ratti
5.	Kumari swarasa	Quantity sufficient

Method of Preparation

1. Kajjali and Tamra bhasma are triturated well and subjected to bhavana with Kumari swarasa for 7 days and a pottali of blunt conical shape is prepared.
2. Pottali is dried and tied up in a silk cloth on which sulphur is smeared.
3. Then the Pottali tied in silk cloth is tied with a rod and suspended it in a Dolayantra containing molten sulphur.
4. The dolayantra is heated on a low fire till the sulphur assumes Vyoma varna (slightly bluish colour) and the contents of the Pottali shows the signs of hardness on being tapped upon the wall of the yantra.
5. The Pottali is removed along with the rod and allowed for swanga sheeta.
6. Then carefully the silk cloth wrapped around the pottali is detached and scraped the Pottali cone to remove any encrustation of excess sulphur or cloth and preserved in suitable air tight container.

Dose: 1 - 3 ratti (125-375 mg)

Anupana: Tulasi swarasa, Roganusara.

Therapeutic Indications: Pandu, Sarva roga

Shelf life of Rasaushadhis

Lot of controversy exists regarding the shelf life of Rasaushadhis and metallic, mineral and herbomineral drug preparations. It has been described in the classics that the Rasaushadhis retain their shelf life for infinite period. This statement needs to be understood cautiously. It has been observed that Rasaushadhis in terms of chemistry- the compounds produced as drugs tend to dissociate after some period, although the period extends in years. In case of Kajjali, it is observed that Kajjali is dissociated within a period of few months. In such circumstances these Rasaushadhis can not retain their shelf life for infinite period. In fact the dissociated product needs to be reprocessed. After reprocessing the product can be put to reuse. Therefore Rasaushadhis need to be tested at fixed intervals, depending upon the nature of the product compound for examining the stability of their compound form. The only difference between plant or animal product based drugs and mineral or metal drugs is that mineral and metal drugs can be reprocessed and put to reuse whereas plant and animal product based drugs need to be discarded when they loose their shelf life. In this reference, the statement of the classics that Rasaushadhis, retain their shelf life for infinite period sounds to be true.

On shelf life of rasaushadhi, in Gazatte notification, G.S.R. 789 (E) has been issued by Government of India on 12th august 2016 for revising shelf life or date of expiry of rasaushadhis defined under clause (a) of section 3 of the act shall be determined based

on scientific data as 5 years and 10 years. 5 years to the Gutika or other preparations containing Kasthaushadhi along with Rasaoushadhis and 10 years to the Gutika or other preparations containing only Rasaoushadhis.

Discussion

Parada is considered as the core of Rasashastra. Importance of Parada in the Ayurvedic pharmaceutics is evident from the fact that the name of pharmaceutical science related to minerals and metals is derived from the name of the Rasa itself. This importance is attributed to Parada on account of its possession of unique physical, chemical and pharmaceutical characteristics. Rasa Acharyas have skilfully exploited these characteristics to make the drug therapeutically more and more useful, active and potent. But In Rasa therapy, Parada is regarded as the most unstable and chemically reactive substance. So the process of Murchana has to be adopted to make it fit for internal administration.

Murchana is a process in which Parada kalpas to develop Avyabhicharita Vyadhighatakatva (disease curing) property or potency. The basic concept behind is that Parada with or without Gandhaka converts in such a suitable compound form which could be used internally in the body for curing diseases even without being reduced/ converted to ashes. One specific type of Murchana in which without heat treatment mercury is processed with Gandhaka is Kajjali (Sagandha Niragni Murchana). It is being used as a primary component and processing of Parada is done along with Gandhaka with heat treatment (Sagandha Agni Murchana) such as Parpati Kalpa, Kupipakwa Rasayana, and Pottali kalpa. They are considered as more potent in their increasing order. The Pottali Rasa is prescribed in medical emergencies and is regarded as an instantly acting drug formulation.

Despite the fact that the Rasa Acharyas consider Parpati Kalpa, Kupipakwa Rasayana and Pottali Rasayana as prominent therapeutic agent, the Kajjali Kalpa-Khalviya Rasayana are likewise similarly effective Rasa yoga helpful in various clinical conditions. Through this processing and preparations, Parada develop a definite diseases curing capacity and after Murchana Parada may not return to its original form (purvavastha).

Conclusion

Ayurveda encompasses the use of multiple compound formulations known as Rasa kalpas to provide a near immediate relief. Depending on the preparation methods, mercury-based preparations are categorized as Khalvi Rasa, Parpati Rasa,

Kupipakwa Rasa, and Pottali Rasa. Kajjali is used in maximum formulations of Rasoushadhisandis the base material of these preparations. Though the Parada kalpas are different in their action and potency, each one of them possess Rasayana effects in its complete sense.

Extended Learning

- Determine role of Yantra, Agni & Kala for pharmaceutical process of chaturvidha rasayana.
- Describe chemical changes occuring during the preparation of chaturvidha rasayana and its impact on Pharmacological action of Chaturvidha Rasayana
- Explain law of Definite proportion and proportion of Mercury and sulphur needed for preparation of sulphide of Mercury in Chaturvidha rasayana

Further References

- Savrikar SS, Ravishankar B. Introduction to 'Rasashaastra' the Iatrochemistry of Ayurveda. Afr J Tradit Complement Altern Med. 2011; 8(5 Suppl):66-82.

MODEL QUESTIONS

Long Answers

- Describe the concept of the khalavi rasakalpa with example of Shwasakuthara Rasa.
- Define parpati, Describe the method of preparation with necessary equipments & write the manufacture of panchamrita parpati.
- Write the manufacturing method with necessary equipments of kupipakwa kalpa with example.
- Describe the Pottali rasayana and explain Hemagarbha pottali.

Short Answers

- Describe the Classification of Rasaushadhi.
- Describe the Kharaliya rasayana.
- Explain the method of preparation of Kajjali.
- Explain the manufacturing method of Rasa sindura with special reference to Kramagni.

CHAPTER 13

CURRENT AND EMERGING TRENDS IN AYURVEDIC PHARMACEUTICALS

PAPER 1

Contents

- **Cosmetics-Formulation, Regulatory Provisions:** Brief introduction to Cosmetics-Formulation, Regulatory Provisions, Plant Layout and other factory requirements, process used in the manufacture of Cosmetics, Most commonly used cosmetic Raw materials, Control of microbial contamination in the manufacture of cosmetics and Quality Control of cosmetics, Skin Sensitization Sensitivity Testing, In vitro-Tests for Skin Irritation, Quality Control of Raw materials, Intermediates and Finished Products, Stability of Cosmetics
- **Introduction to Dosage forms:** Introduction, Classification of Dosage forms (Solid dosage forms, Liquid dosage forms and Semisolid dosage forms), Need of dosage forms.

Learning Outcome

At the end of this chapter, Students can able to

1. Describe the classification of different dosage forms
2. Explain the need of different dosage forms.
3. Choose and record the contemporary machineries used in the manufacture of cosmetics.
4. Enlist Quality Control parameters of cosmetics preparations.

Introduction

The history of cosmetics or beautification dates back to the Indus Valley civilization around 2500 to 1550 BCE. Both men and women were used to makeup themselves to improve their appearance. "Anangaranga" is a book dedicated to cosmetics in ancient India. In recent years cosmetics gained much importance and have become a part of life. The cosmetics industry is one of the major parts of the nation's economy.

Cosmetics

As per The Drugs and Cosmetics Act 1940, "Cosmetics" means any article intended to be rubbed, poured, sprinkled or sprayed on, or introduced into, or otherwise applied to, the human body or any part there of for cleansing, beautifying, promoting attractiveness, or altering the appearance and includes any article intended for use as a component of cosmetic.

In general, Cosmetics are substances or products used to enhance or alter the appearance of the face or the fragrance or texture of the body

The Drugs and Cosmetic Act of 1945 laid down the rules and regulations related to cosmetic manufacturing companies in India. Schedule M-II explains the manufacturing of cosmetics.

The cosmetics are divided into 11 types.

1. Aerosol
2. Alcoholic Fragrance Solutions (Cologne)
3. Skin Creams, lotions, shaving creams, emulsions, pastes, Bindi (Liquid), Kum Kum Powder, milk, soap-based/synthetic-detergent-based shampoos, pomade, shaving creams, brilliant Oils, etc.
4. Depilatories chemicals
5. Preparations used for eyes (Mascara, Eye Liner)
6. Hair Dyes (Oxidation hair dyes, Henna Powder, Powder Hair Dye & Liquid)
7. Lipsticks, Lipsalve, Cosmetic Pencils & Lip Gloss etc.
8. Nail Polishes, Nail Enamel, and Nail Lacquers
9. Skin Powders (Adults and Babies)
10. Toilet Soaps (Liquid, Baby, Shaving, Transparent etc.)
11. Tooth Powders and Tooth Pastes etc.

Regulatory Provisions

As per D & C Act 1940 Schedule M-II

Requirements of Factory Premises For the Manufacture of Cosmetics

1. General Requirements

a) **Location and surroundings-** The factory shall be located in a sanitary place and hygienic conditions shall be maintained in the premises. Premises shall not be used for residence or be interconnected with residential areas. It shall be well-ventilated and clean.

b) **Buildings-** The buildings used for the factory shall be constructed so as to permit production under hygienic conditions and not to permit entry of insects, rodents, flies, etc. The walls of the room in which manufacturing operations are carried out, shall be up to a height of six feet from the floor, be smooth, waterproof, and capable of being kept clean. The flooring shall be smooth, even, and washable and shall be such as not to permit retention or accumulation of dust.

c) **Water supply-** The water used in manufacture shall be of potable quality.

d) **Disposal of water-** Suitable arrangements shall be made for the disposal of waste water.

e) **Health, clothing, and sanitary requirements of the staff-** All workers shall be free from contagious or infectious diseases. They shall be provided with clean uniforms, masks, headgear, and gloves wherever required. Washing facilities shall also be provided.

f) Medical Services- Adequate facilities for first-aid shall be provided.

g) Work benches shall be provided for carrying out operations such as filling, labelling, packing, etc. Such benches shall be fitted with smooth, impervious tops capable of being washed.

h) Adequate facilities shall be provided for washing and drying of glass containers if the same is to be used for packing the product.

2. Requirements of Plant and Equipment

The following equipment, area and other requirements are manufacture of recommended for the manufacture of-

I. POWDERS

Face powder, cake make-up, compacts, face-packs, masks and rouges, etc.

1. Equipment

(a) Powder mixer of a suitable type provided with a dust collector.

(b) Perfume and colour blender.

(c) Sifter with sieves of suitable mesh size.

(d) Ball mill or suitable grinder.

(e) Trays and scoops (stainless steel).

(f) Filling and sealing equipment provided with dust extractor.

(g) For compacts: -(i) a separate mixer, (ii) a compact pressing machine.

(h) Weighing and measuring devices.

(i) Storage tanks.

An area of 15 square metres is recommended. The section is to be provided with adequate exhaust fans.

II. CREAMS, LOTIONS, EMULSIONS, PASTES, CLEANSING MILKS, SHAMPOOS, POMADE, BRILLIANTINE, SHAVING CREAMS AND HAIR OILS, ETC.

(a) Mixing and storage tanks of suitable materials.

(b) Heating kettle steam, gas or electrically heated.

(c) Suitable agitator.

(d) Colloidal mill or homogeniser (wherever necessary).

(e) Triple roller mill (wherever necessary).

(f) Filling and sealing equipment.

(g) Weighing and measuring devices.

An area of 25 square metres is recommended.

III. NAIL POLISHES AND NAIL LACQUERS

1. Equipment

(a) A suitable mixer.

(b) Storage tanks.

(c) Filling machine- hand operated or power driven.

(d) Weighing and Measuring devices.

An area of 15 square metres is recommended. The section shall be provided with a flame-proof exhaust system.

2. Premises

The following are the special requirements related to Nail Polishes and Nail Lacquers:

(a) It shall be situated in an industrial area.

(b) It shall be separate from other cosmetic-manufacturing areas by metal/brick partition up to the ceiling.

(c) Floors, walls, ceilings and doors shall be fire proof.

(d) Smoking, cooking and dwelling shall not be permitted and no naked flame shall be brought in the premises.

(e) All electrical wiring and connections shall be concealed and the main electric switch shall be outside the manufacturing area.

(f) All equipment, furniture and light fittings in the section shall be flame proof.

(g) Fire extinguishers like foam and dry powder and a sufficient number of buckets containing sand shall be provided.

(h) All doors of the section shall open outwards.

3. Storage

Explosive solvents and ingredients shall be stored in metal cupboards or in a separate enclosed area.

4. Manufacture

(a) Manufacture of lacquer shall not be undertaken unless the above conditions are complied with.

(b) Workers shall be asked to wear shoes with rubber soles in the section.

5. Other Requirements

No objection certificate from the local Fire Brigade Authorities shall be furnished.

IV. LIPSTICKS AND LIP-GLOSS, etc.

1. Equipment

(a) Vertical mixer.

(b) Jacketed kettle- steam, gas or electrically heated.

(c) Mixing vessel (stainless steel)

(d) Triple roller mill/Ball mill.

(e) Moulds with refrigeration facility.

(f) Weighing and measuring devices.

An area of 15 square metres is recommended.

V. DEPILATORIES

1. Equipment

(a) Mixing tanks.

(b) Mixer.

(c) Triple roller mill or homogeniser (where necessary).

(d) Filling and sealing equipment.

(e) Weighing and measuring devices.

(f) Moulds (where necessary).

An area of 10 square metres is recommended.

VI. PREPARATIONS USED FOR EYES

Preparations shall be manufactured under strict hygienic conditions to ensure that these are safe for use.

1. Eyebrows, Eyelashes, Eyeliners, etc.

1. Equipment

(a) Mixing tanks.

(b) A suitable mixer.

(c) Homogeniser (where necessary).

(d) Filling and sealing equipment.

(e) Weighing and measuring devices.

An area of 10 square metres is recommended.

2. Kajal and Surma

1. Equipment

(a) Base steriliser.

(b) Powder steriliser (dry heat oven).
(c) Stainless steel tanks.
(d) A suitable Mixer
(e) Stainless steel sieves.
(f) Filling and sealing arrangements.
(g) Weighing and measuring devices.
(h) Homogeniser (where necessary)
(i) Pestle and Mortar (for Surma).

An area of 10 square metres with a separate area of 5 square metres for base sterilization is recommended.

Other Requirements For 1 and 2

(a) False ceiling shall be provided wherever required.
(b) Manufacturing area shall be made fly proof. An airlock or an air curtain shall be provided.
(c) Base used for Kajal shall be sterilised by heating the base at 150 degree C for required time in a separate enclosed area.
(d) The vegetable carbon black powder shall be sterilised in a drying oven at 120 degree C for required time.
(e) All utensils used for manufacture shall be of stainless steel and shall be washed with detergent water, antiseptic liquid and again with distilled water.
(f) Containers employed for 'Kajal shall be cleaned properly with bactericidal solution and dried.
(g) Workers shall put on clean overalls and use hand gloves wherever necessary.

VII. AEROSOL

1. Equipment

(a) Air compressor (wherever necessary).
(b) Mixing tanks.
(c) Suitable propellant filling and crimping equipment.
(d) Liquid filling unit.
(e) Leak testing equipment.
(f) Fire extinguisher (wherever necessary).
(g) Suitable filtration equipment.
(h) Weighing and measuring devices.

An area of 15 square metres is recommended.

2. Other Requirements

No objection certificate from the Local Fire Brigade Authorities shall be furnished.

VIII. ALCOHOLIC FRAGRANCE SOLUTIONS

Equipment

(a) Mixing tanks with stirrer
(b) Filtering equipment.
(c) Filling and sealing equipment.
(d) Weighing and measuring devices.

An area of 15 square metres is recommended.

IX. HAIR DYES

Equipment

(a) Stainless steel tanks.
(b) Mixer.
(c) Filling Unit.
(d) Weighing and measuring devices.
(e) Masks, gloves and goggles.

An area of 15 square metres with proper exhaust is recommended.

X. TOOTH-POWDERS AND TOOTHPASTE, etc.

1. Tooth-powder

General Equipment

(a) Weighing and measuring devices.
(b) Dry mixer (powder blender).
(c) Stainless steel sieves.
(d) Powder filling and sealing equipment.

An area of 15 square metres with proper exhaust is recommended.

2. Toothpaste

Equipment

(a) Weighing and measuring devices.
(b) Kettle steam, gas or electrically heated (where necessary).
(c) Planetary mixer with deaerator system.
(d) Stainless steel tanks.
(e) Tube filling equipment, Crimping machine.

An additional area of 15 square metres with proper exhaust is recommended.

3. Tooth-powder (Black).

Equipment

(a) Weighing and measuring devices.

(b) Dry mixer powder blender.

(c) Stainless steel sieves.

(d) Powder filling arrangements.

An area of 15 square metres with proper exhaust is recommended. Areas for manufacturing "Black" and "White" tooth-powders should be separate.

XI. Toilet Soaps

Equipment

(a) Kettles/pans for saponification.

(b) Boiler or any other suitable heating arrangement.

(c) Suitable stirring arrangement.

(d) Storage tanks or trays.

(e) Driers

(f) Amalgamator/chipping machine.

(g) Mixer.

(h) Triple roller mill.

(i) Granulator

(j) Plodder.

(k) Cutter.

(l) Pressing, stamping and embossing machine.

(m) Weighing and measuring devices.

A minimum area of 10 square metres is recommended for the small-scale manufacture of toilet soaps.

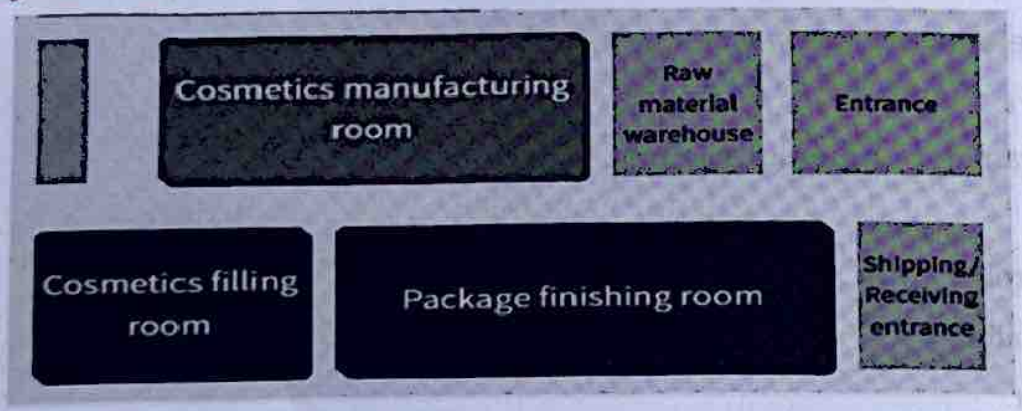
The areas recommended above are for the basic manufacturing of different categories of cosmetics. In addition to that separate adequate space for storage of raw materials, finished products, and packing materials shall be provided in factory premises.

Note I: The above requirements of the Schedule are made subject to modification at the discretion of the Licensing Authority if he is of the opinion that having regard to the nature and extent of the manufacturing operations it is necessary to relax or alter that in the circumstances of a particular case

Note II. The above requirements do not include requirements of machinery, equipment and premises required for the preparation of containers and closers of different categories of cosmetics. The Licensing Authority shall have the discretion to examine the suitability and adequacy of the machinery, equipment and premises for the purpose taking into consideration the requirements of the licensee.

Note III. Schedule M-11 specifies equipment and space required for certain categories of cosmetics only. There are other cosmetics items, viz. Attars, perfumes, etc., which are not covered in the above categories. The Licensing Authority shall, in respect of such items or categories of cosmetics, have the discretion to examine the adequacy of factory premises, space, plant and machinery and other requisites having regard to the nature and extent of the manufacturing operations involved and direct the licensee to carry on necessary modification in them.

Factory Layout Plan



Processes involved in the Manufacture of Cosmetics

Processes used in the manufacture of cosmetics are:

1. Emulsification
2. Mixing
3. Compaction
4. Moulding
5. Packing

Most Commonly Used Cosmetic Raw Materials

The principal raw materials used for manufacturing cosmetics are

1. Oily materials such as oils, fats, wax esters, and ester oils,
2. Surface-active agents are used as emulsifiers,
3. Solubilizing agents
4. Humectants,
5. Thickening agents,
6. Film formers, as well as polymers, are used as powders,

7. Ultraviolet absorbents,
8. Antioxidants,
9. Sequestering agents,
10. Colouring agents such as dyes and pigments, along with vitamins.
11. Pharmaceutical agents such as plant extracts and perfume.

Humectant: A humectant is a substance that is used to keep products moisturized and affects the preservation of items, which can be used in cosmetic products. It can increase skin hydration and helps to remove and reduce thickness of skin.

Humectants are ingredients that attract and bind water. In skin care, they draw water from the deeper layers of the skin to the outermost layer. If air humidity is higher than 70%, they also draw water from the surrounding environment to the skin. In hair care, humectants perform a similar function. They attract water to the hair shaft, helping keep it hydrated.

Some examples of humectants include: Glycerin, Urea, Hyaluronic acid, Salicylic acid, Alpha hydroxy acids (AHAs), such as glycolic acid and lactic acid, Propylene glycol, Honey, Sorbitol

Antioxidants: Antioxidants are substances that can slow down or prevent the damage caused by free radicals by neutralising them. Antioxidants helps to protect skin cells from damage and aging and may improve skin texture and appearance.

Other Raw Materials which are essential in the preparation of Cosmetics are Acids- Citric acid and lactic acid are multifunctional components that can be used efficiently as exfoliants, pH balancers, and preservatives in cosmetics. Highly active, specialty ingredients to increase skin and hair products power and effectiveness.

Active Ingredients- From ingredients that exfoliate, soothe, hydrate and revitalize to those that nourish skin cells and protect them from free radical damage.

- SPF Boosting-zinc oxide, titanium dioxide, avobenzone, oxybenzone, vitamin A/ retinoids, vitamin C, natural vitamin E, d-alpha-tocopherol
- **Dryness:** hyaluronic acid, vitamin E
- **Pigmentation issues:** Kojic acid, AHAs, BHA, hydroquinone, vitamin C, Sodium Ascorbyl Phosphate, Magnesium Ascorbyl Phosphate, Kojic Acid, Dipalmitate, Niacinamide, Alpha Arbutin, Beta Arbutin
- **Acne:** vitamin A/retinoids, salicylic acid, benzoyl peroxide, azelaic acid.

Alkalis- Alkaline components are often used to adjust pH concentrations as buffering agents.

Amino Acids- Surfactant Anions & Bases of Shampoo, Provide offers a range of surfactants for both hair and skin care products for those partly lathered; perfect for shampoos, skin cleansers, bubble baths or body washing.

Anti-Dandruff- The non-toxic compound is used as a gentle alternative to zinc pyrithione in anti-dandruff shampoos.

Silicones- Silicones are key ingredients in any formulation. It gives a soft and smooth texture to products. In Personal care Silicone fluid (Dimethicone) comes with viscosity between 100 cps to 300000 cps, Cyclopentasiloxane (Decamethyl cyclo penta siloxane) is widely used in skincare, sunscreen, makeup, hair conditioning products.

Antioxidants- Antioxidants both rejuvenate the skin and protect it against free radical scavenging, disturbing molecules which are known to damage healthy cells and cause premature ageing. The preserving of skin's juvenile elasticity requires antioxidants.

D Panthenol- D Panthenol for hair is highly effective and a key ingredient because, Panthenol is more like a protein than a vitamin in some ways, despite its origin. When hair is washed with a phenolic product, the ingredient penetrates the hair shaft and enhances the retention of humidity. Panthenol is therefore a popular choice for people with fine or fragile hair.

Antimicrobial Agents- The cosmetic usually contains Cosmetic raw materials as Staphylococci Diphtheroids organic agents are used Inducted in the cosmetic raw material that usually contains staphylococci. Diphtheroids fungi antimicrobial agents to prevent cosmetic products from contamination of micro-organics (bacteria, yeast, fungi). It must be colourless and odour less. It should be non-toxic and should not be skin-allergic.

Perfumes- Fragrant vital oil and flavor combinations, fixatives and solvents are a combination that offers a pleasant smell to the human body, items and living areas.

Natural Ingredients

Flowers : *Rose, Jasmine, Mimosa,*

Tuberose fruits : *Coriander, Caraway, Coca, Cardamom, Anise, Lemon and Grapefruits.*

Roots family : *Resins Roots, Peru bal-sandalwood, Rosewood.*

Soft Paraffin- A combination of petroleum-purified paraffin hydrocarbons. Liquid Light Paraffin, and Heavy liquid paraffin, Active as an emollient, avoids and promotes the loss of skin water.

Glycerine- This pharmaceutical ingredient is utilized as a moisturizer to treat or avoid dry, unpleasant, textured, bothersome skin and minor skin aggravations.

The purity of glycerine is of great importance as glycerine can be made from various sources. Vegetable Glycerine has soft skin characteristics and has become a common additive in cosmetics today.

Menthyl Lactate- The cooling medium and a fragrant substance in personal care products are an ester of menthol and lactic acid menthyl lactate. Menthyl lactate can be used with hydrating agents, cleansing products and other skin care products and also with make-up, shampoos and hair colours. In comparison with Menthol, the drug has a value and is, therefore, a key ingredient in premium formulations in cosmetics and skin care products.

Natural Vitamin E- Vitamins are micronutrients that improve cosmetic products. They are classified according to their chemical activity and benefit the cosmetic products. They can act as antioxidants, cell regenerators and catalysts for many biological functions of the skin. They have different biochemical functions. This is one of the *Cosmetic raw materials* used in most of the products related to Skin. Vitamin E has a significant part to play in safeguarding the skin from decay every day, including abuse of internal environmental components. It also helps to decrease the look of fine lines.

Butters- Nothing more nurturing and soothing than adding creamy butter to cosmetic formulation is required to treat dry, thirsty skin. Butter is full of natural oils, fatty acids and proteins, ideal for creams, lotions and balsamic.

Bases in Hair Conditioner & Cationic Surfactants- Cationic surfactants are commonly used in conditioning products, as opposed to anionic surfactants. These gentle surfactants are suitable for shampoo, bathroom and shower gels and skin-clearing agents.

Clays- The spa experience is perfect for them, full of nutrients and minerals. The tone was used historically to promote health and well-being, to detox, heal and rejuvenate its properties. Soap manufacturers also find these clays in substitution of synthetic colours, which is the perfect addition to their products. Natural replacement of clays is also available.

Colours- To highlight the products by choosing beautifully cosmetic colour like natural blue Indigo spot, the bright blue, the yellow sunset and the fiery red rainbow.

Emollients- The product range is used to soften and smooth the skin and prevent scaling and drought. They can be integrated into both natural and synthetic formulations to maintain glide and silky feelings.

Exfoliants- Various texture-free natural exfoliates enable to create products for all skin types and concerns, such as body, face and even the most sensitive skin. From beautiful ground pearls to salt, to more solid particles to a more rigorous, body-friendly scrub.

Hair Care

Humectants- Humectants are a significant ingredient in the skin and hair care products as they serve as a moisture magnet, absorb water in the air and keep the skin tight and moisturized. D-panthenol is an excellent Humectant.

Non-Ionic Surfactants & Foam Stabilisers- Skincare and hair care products, including shampoos, skin cleansers, body washes, and bubbles, are supported in the form of fumes, cleaners and viscosity aids.

Proteins- Proteins form a protection film on the skin or hair like a sunflower, while protein hydrolysates are small blocks that work like hydrants and additives for skin repair.

Resinoids, Gums & Crystals- Due to its unique aromas, resinoids and gums are widely used in perfume. They can be used to fix and mix fragrances, cops, soaps, and incense.

Salts- Cosmetic salts includes exfoliation, special salts to cleanse and relax soaking sore muscles, and salt.

Solubilisers & Emulsifiers- A seamless method for the process of making products, solubilizers and emulsifiers work. This offer solutions for all things for hair care, including hydrating agents, shampoos, skin cleansers, bubble baths and body cleaning. Polysorbates 20, 40, 60 in personal-care products are solubilizers.

Solvents- Solvents (transporters) help dissolve common cosmetic ingredients to achieve the quality that needed in a product.

Sunscreen- Given that 90% of premature ageing is due to the sun, the essential active part of any formulation can be said to be this. For protection from damaging UVA and UVB light, both physical blockers and chemical sunscreens are added.

Thickeners- A wide range of thickeners for all applications are used to increase the viscosity of the products.

Tinctures- Tinctures are herbal and plant-alcoholic extracts, used in scents, creams, and products for the body.

Microbial contamination in cosmetics can be controlled by

- Sanitary processing
- Using preservatives
- Aseptic conditions
- Water treatment
- Microbial control of raw materials
- Equipment disinfection

- Qualification of personnel
- Microbiological quality assurance

Some common pathogens are Staphylococcus aureus, Pseudomonas aeruginosa, Escherichia coli, and Candida albicans.

The total aerobic microbe counts of cosmetics for children under the age of three should be below 100 CFU/g or ml.

Other cosmetic products should be below 1,000 CFU/g or ml

Quality Control of Cosmetics

Quality control is an ongoing process. It is a comparison with a standard of whether a cosmetic product adheres to a certain criterion. Standard consists of:

1. **Formula:** This gives the precise statement of different ingredients which comprise the product.
2. **Operating Standards:** This gives details of manufacturing procedures, storage, filling and packaging.
3. **Raw material Specification:** Giving all details of characteristics and limits of deviations permissible.
4. **Packaging material standards:** It covers all components which go around the product shape, size, colour and other aesthetics and acceptance criteria and limits.
5. **Finished product standard:** It covers all characteristics essential for proper performance, durability and safety of the product.
6. **Testing methods:** This covers test procedures of all components

Quality control could be divided into:

1. Raw material and packaging material quality control
2. Finished product quality control.
3. Microbiological quality control
4. Production line quality control.

1. Raw Material Quality Control

The cosmetic raw materials vary in nature. The Bureau of Indian Standards has done commendable work in fixing specifications for many raw materials used in cosmetics. The raw materials which do not have IS standards are normally analysed as per I.P., B.P., U.S.P. or CTFA specifications.

The tests normally involve:

Physical Parameters: Colour, odour, density, refractive index, viscosity, etc.

Chemical Parameters: Like assay of active ingredients, impurities present, etc.

Drugs & Cosmetics Act specifies the limits of impurities in cosmetic raw materials like lead, arsenic and heavy metals. Soon new specifications may be added for other heavy metals.

Packaging material quality control: Cosmetic packaging has special importance as it enhances aesthetics. Packaging acts as a protector to the product which is sold at the same time it gives eye appeal. Many times, sales take place due to aesthetics which is also known as Impulse purchase. The main purpose of packaging material quality control is to weed out defective packaging. The effect could be classified into

1. **Critical defects:** Which lead to total spoilage like cracked neck of bottle. It may be unsafe for users.
2. **Major defects:** These defects are very obvious defects which may not functionally give problems.
3. **Minor defects:** These defects are minor in nature but will have an effect on aesthetic appeal.

Statistical techniques are used for sampling and interpreting the results. Based on the sampling plan, samples are drawn and inspected.

2. Finished Product Quality Control

Finished product quality control involves testing physical and chemical parameters.

1. **Colour:** Shade matching is one of the important aspects of quality control of cosmetics. Mostly colour matching is done by visual means by colour experts. It is always a comparison between a standard and a sample lot. Visual observations are made on two films drawn of similar thickness depending on the type of products either glass slides or drawn apparatus is used for producing film of uniform thickness. Colour-matching computers are available nowadays.
2. **Density-Specific gravity:** Usually specific gravity cups are used which are calibrated for a particular weight of water.
3. **Viscosity:** Different types of instruments are available. The most popular one is called Brookfield viscometer. This instrument is based on spring which is attached to spindles. The viscosity is measured based on the torque registered on the spring indicated on the dial. Other viscometers are falling ball viscometers, Gardner tubes or Ford cups which are based on different principles.
4. **Melting point or boiling point:** The usual capillary method is followed for melting point. The boiling range is also done using a normal distillation set-up. Nowadays instrument to determine M.P/B.P. is available.

5. **Hardness- Softness:** This kind of testing is done using a penetrometer. A needle penetrates the block of desired mass and the depth of penetration indicates the hardness. There are other means like break points which are measured by specialized instruments.
6. **Foam Tests:** Foam tests are done using cylinder methods and there are instruments like the Ross Miles apparatus used for measuring foam.
7. **Accelerated stability tests:** Many cosmetic products are emulsions. Emulsions are prone to degradation. The tendency of emulsion degradation is usually checked by accelerated tests like storage of products at elevated temperatures like 40, 45, 50°C or putting them under high-stress conditions like centrifugal force and artificial humidity conditions or exposure to extreme daylight conditions. These tests are also done for non-emulsion products to assess perfume stability, physical separation, sweating, etc.
8. **Chemical tests:** These are usual tests carried out to find out acidity, alkalinity assay of particular active ingredient, etc.

BIS (Bureau of Indian Standards) lays down specifications for finished cosmetics as per Schedule S of the Drugs and Cosmetics Act 1940. Perhaps India was the only country that had standards for Finished Cosmetics.

Instruments like thin layer chromatography, Gas Liquid chromatograph, High pressure liquid chromatograph and infrared and ultraviolet spectrophotometers, Skin meters are widely used for raw material as well as finished product quality control.

Microbiological Quality Control

Each manufacturer must ensure products manufactured are safe for use by the customers. Many of the bacteria which come from the surrounding environment or coming from raw materials are not safe. Some of the microorganisms are relatively harmless. Microbiological quality control is aimed at ensuring that all the finished products are free from harmful pathogenic bacteria and other bacteria within the limit.

Skin Sensitization Sensitivity Test

OECD Guideline 406 is a test guideline for assessing the potential of chemicals to cause skin sensitization in animals. It was originally adopted in 1981 and updated in 1991. Skin sensitisation is the regulatory endpoint aiming at the identification of chemicals able to elicit an allergic response in susceptible individuals. Following repeated exposure to a sensitising agent, the adverse health effect of allergic contact dermatitis (ACD) may be provoked.

Skin sensitizers are substances that elicit an allergic response, such as allergic contact dermatitis, following contact with the skin. Allergic contact dermatitis causes itching, swelling, and redness of the skin in susceptible individuals. Skin sensitization

testing identifies the potential for a substance to cause allergic contact dermatitis. Skin sensitization test data enable appropriate classification and labeling to alert handlers and consumers to potential hazards. These data may also be used to determine levels of sensitizers that will not produce allergic sensitization.

Skin sensitization testing is traditionally performed using either human tests such as the human repeat insult patch test and the human maximization test or animal tests such as the murine local lymph node assay (LLNA), the guinea pig maximization test, and the Buehler test.

The guinea pig has been the animal of choice for predictive sensitisation tests for several decades. Two types of tests have been developed: adjuvant tests in which sensitisation is potentiated by the injection of Freunds Complete Adjuvant (FCA), and non-adjuvant tests. In the original guideline 406, four adjuvant tests and three non-adjuvant tests were considered to be acceptable. In this updated version, the Guinea Pig Maximisation Test (GPMT) of Magnusson and Kligman which uses adjuvant and the non-adjuvant Buehler Test are given preference over other methods.

The immune system of the mouse has been investigated more extensively than that of the guinea pig. Recently, mouse models for assessing sensitisation potential have been developed that offer the advantages of an endpoint which is measured objectively, short duration and minimal animal treatment. The mouse ear swelling test (MEST) and the local lymph node assay (LLNA) appear to be promising.

General Principle of Sensitisation Tests in Guinea Pigs

The test animals are initially exposed to the test substance by intradermal injection and/or epidermal application (induction exposure). Following a rest period of 10 to 14 days, during which an immune response may develop, the animals are exposed to a challenge dose. The extent and degree of skin reaction to the challenge exposure in the test animals is compared with that demonstrated by control animals which undergo same treatment during induction and receive the challenge exposure.

The flanks of treated and control animals are cleared of hair. A patch or chamber loaded with the test substance is applied to one flank of the animals and, when relevant, a patch or chamber loaded with the vehicle only may also be applied to the other flank. The patches are held in contact by an occlusive dressing for 24 hours.

Observations- Approximately 21 hours after removing the patch the challenge area is cleaned and closely-clipped and/or shaved or approximately 3 hours later (approximately 48 hours from the start of the challenge application) the skin reaction is observed and recorded according to the grades shown below; approximately 24 hours after this observation a second observation (72 hours) is made and once again recorded. Blind reading of test and control animals is encouraged.

Magnusson & Kligman grading scale for the evaluation of challenge patch test reactions: 0 = No visible change; 1 = Discrete or patchy erythema; 2 = Moderate and confluent erythema; 3 = Intense erythema and swelling

Clinical observations- All skin reactions and any unusual findings, including systemic reactions, resulting from induction and challenge procedures should be observed and recorded. Histopathological examination, the measurement of skin fold thickness, may be carried out to clarify doubtful reactions.

Invitro Test For Skin Irritation

However, interest in alternative non-animal approaches is increasing due to ethical concerns about animal testing, legal restrictions on the use of animal data, and scientific concerns about the relevance of animal test results to human outcomes. This interest has resulted in a number of focused activities to support the development and acceptance of alternative approaches to reduce or replace animal use in skin sensitization testing.

Skin irritation refers to the production of reversible damage to the skin occurring after exposure to a substance or mixture This Test Guideline (TG) provides an in vitro procedure that may be used for the hazard identification of irritant chemicals (substances and mixtures) in accordance with UN GHS Category. Depending on the regulatory frame work and the classification system in use, this TG may be used to determine the skin irritancy of chemicals either as a stand-alone replacement test for in vivo skin irritation testing or as a partial replacement test within a testing strategy.

The OECD Test Guideline (TG) 439 is a test method for identifying irritating chemicals. It uses the reconstructed human epidermis (RhE) to mimic the properties of the human epidermis. The OECD TG 439 Skin Irritation Test (SIT) can differentiate between category 2 irritants and non-irritants. It's based on tissue viability.

Principle of the Test

The test chemical is applied topically to a three-dimensional RhE model, comprised of non-transformed human-derived epidermal keratinocytes, which have been cultured to form a multi-layered, highly differentiated model of the human epidermis. It consists of organized basal, spinous and granular layers, and a multi-layered stratum corneum containing intercellular lamellar lipid layers representing main lipid classes analogous to those found in vivo. Chemical-induced skin irritation, manifested mainly by erythema and oedema, is the result of a cascade of events beginning with penetration of the chemicals through the stratum corneum where they may damage the underlying layers of keratinocytes and other skin cells. The damaged cells may either release inflammatory mediators or induce an inflammatory cascade which also acts on the cells in the dermis, particularly the stromal and endothelial cells of the blood vessels. It is the

dilation and increased permeability of the endothelial cells that produce the observed erythema and oedema. Notably, the RhE-based test methods, in the absence of any vascularisation in the in vitro test system, measure the initiating events in the cascade, e.g. cell/tissue damage, using cell viability as readout. Cell viability in RhE model is measured by enzymatic conversion of the vital dye MTT [3-(4, 5-Dimethylthiazol-2-yl) -2, 5-diphenyltetrazolium bromide, Thiazolyl blue; CAS number 298-93-1, into a blue formazan salt that is quantitatively measured after extraction from tissues. Irritant chemicals are identified by their ability to decrease cell viability below the defined threshold levels. Depending on the regulatory framework and applicability of the TG, test chemicals that produce cell viabilities above the defined threshold level, may be considered non-irritants.

According to the test procedure, it is essential that the viability measurement is not performed immediately after exposure to the test chemical, but after a sufficiently long post-treatment incubation period of the rinsed tissue in fresh medium. This period allows both for recovery from weak cytotoxic effects and for appearance of clear cytotoxic effects. A 42 hours post-treatment incubation period was found optimal during test optimisation of two of the RhE-based test methods. The MTT assay is a standardised quantitative method which should be used to measure cell viability under this TG. It is compatible with use in a three-dimensional tissue construct. The tissue sample is placed in MTT solution of appropriate concentration (e.g. 0.3 - 1 mg/mL) for 3 hours. The MTT is converted into blue formazan by the viable cells. The precipitated blue formazan product is then extracted from the tissue using a solvent (e.g. isopropanol, acidic isopropanol), and the concentration of formazan is measured by determining the OD at 570 nm using a filter band pass of maximum ± 30 nm or, by using an HPLC/ UPLC-spectrophotometry procedure.

Stability Study of Cosmetics

There are three basic forms of stability tests:

1. **Physical and chemical integrity:** These evaluate the colour, odour or fragrance, pH value, viscosity, texture and emulsion stability, or signs of separation.
2. **Microbiological stability:** These evaluate the degree of contamination with bacteria, mould and/or yeast.
3. **Packaging stability:** These evaluate the effect of packaging on the contained product.

CHAPTER THIRTEEN

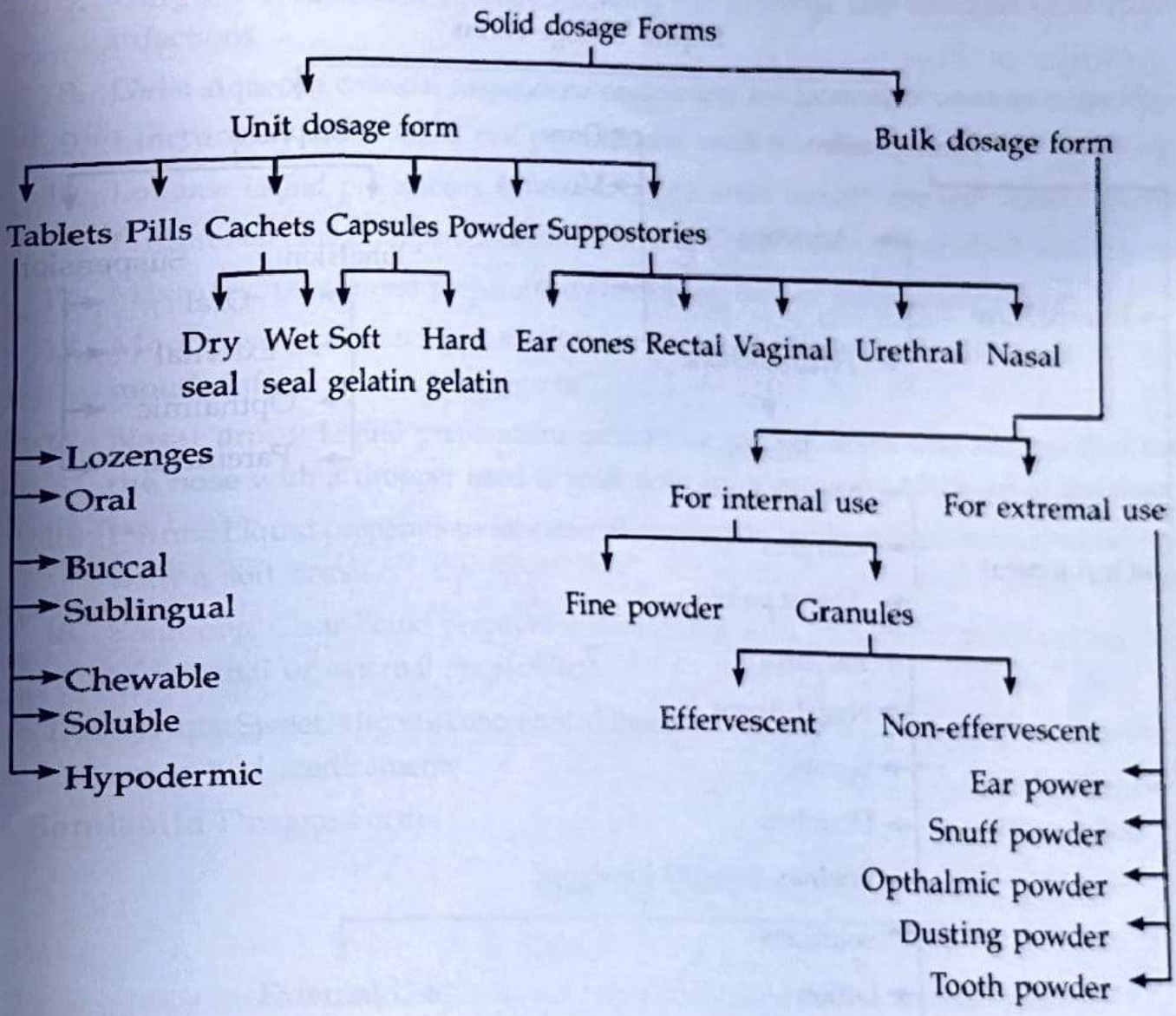
Introduction to Dosage Forms

Definition: Dosage forms are the mechanism by which drug molecules/Active Pharmaceutical Ingredients (API) are administered to areas of action inside the body to generate maximum intended benefits and the lowest unwanted effects.

Classification of Dosage Forms

1. Solid Dosage Forms
2. Liquid Dosage Forms
3. Semisolid Dosage Forms

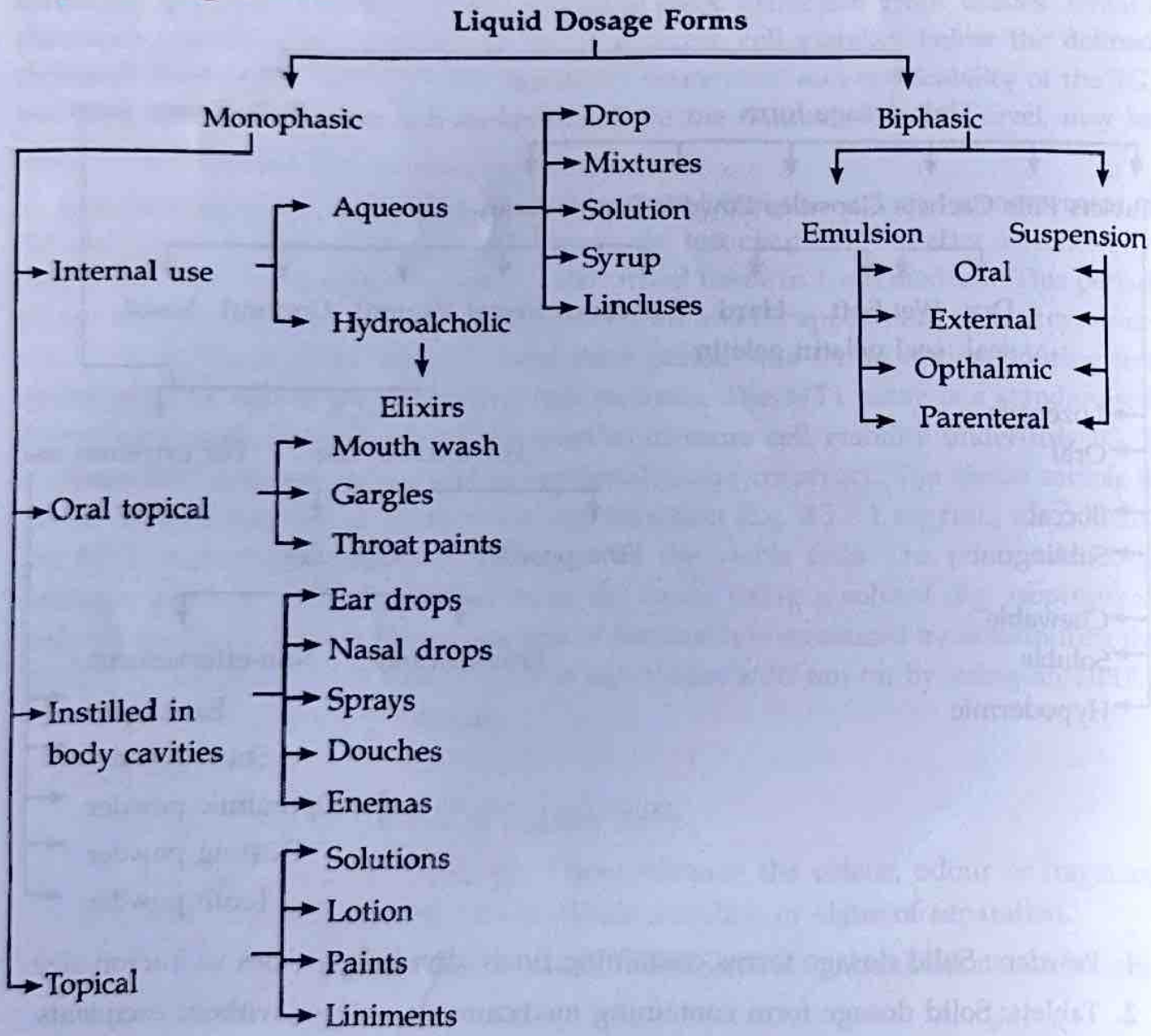
Solid Dosage Forms



1. **Powders:** Solid dosage forms containing finely divided particles in micron size
2. **Tablets:** Solid dosage form containing medicaments with or without excipients
3. **Granules:** Aggregate of particles
4. **Capsules:** The drug enclosed with a gelatin capsule
5. **Cachets:** Drugs enclosed with a wafer sheet of rice
6. **Pills:** Small tablets containing excipients
7. **Lozenges:** Solid preparations containing sugar and gum used to medicate mouth and throat

8. **Suppositories:** Solid dosage containing medicaments with suitable suppository base that are inserted in to the body cavities other than the mouth, like the rectum, nose, ear
9. **Poultices:** Solid dosage form converted to paste-like preparation used externally in the skin to reduce inflammation

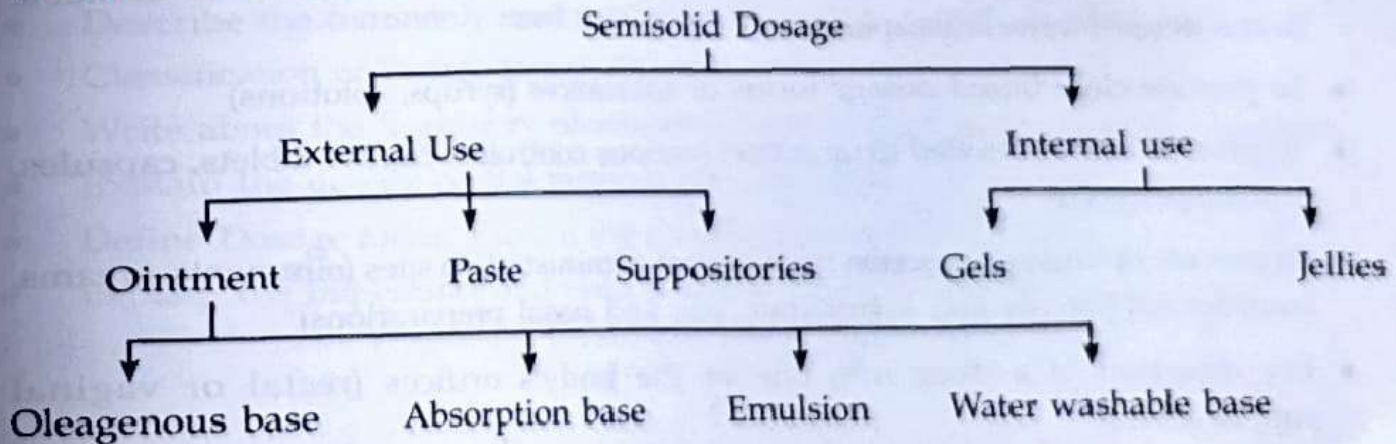
Liquid Dosage Forms



1. **Collodions:** Liquid preparations for external use having nitrocellulose used to protect the skin
2. **Droughts:** Liquid preparations for oral containing medicaments available in single-dose or multiple-dose
3. **Elixirs:** Liquid preparation for oral containing medicaments with suitable excipients

4. **Emulsions:** Biphasic liquid dosage form for oral containing medicaments in which fine oil globules dispersed in continuous phase
5. **Suspensions:** Biphasic liquid dosage form for oral containing medicaments in which fine solid particles suspended in continuous phase
6. **Enemas:** Liquid preparation for rectal containing medicaments
7. **Gargles:** Concentrated aqueous solutions for external use used to treat throat infections
8. **Gels:** Aqueous colloidal suspensions containing medicaments used as antacids
9. **Linctuses:** Viscous, liquid oral preparations used to relieve cough
10. **Lotions:** Liquid preparations for external application usually applied without friction
11. **Liniments:** Liquid preparations for external application usually applied with friction
12. **Mixtures:** Liquid oral preparations containing one or more medicaments
13. **Mouth washes:** Concentrated aqueous solutions for external use used to treat mouth infections and oral hygiene
14. **Nasal drops:** Liquid preparations containing medicaments that are instilled into the nose with a dropper used to treat nose infections and blockage of the nose
15. **Paints:** Liquid preparations for external application to the skin or mucous membrane with a soft brush
16. **Solutions:** Clear liquid preparation containing with or without medicaments used to internal or external preparations
17. **Syrups:** Sweet, viscous, concentrated liquid preparations containing with or without sugar and medicaments

Semisolid Dosage Forms



1. **Ointments:** Semisolid dosage forms for external use containing with or without medicaments with a suitable ointment base

2. **Creams:** Semisolid dosage forms for external use containing with or without medicaments with a suitable fatty base
3. **Paste:** Semisolid dosage forms for external use containing a high proportion of finely powdered medicaments with a suitable fatty base
4. **Gels:** Transparent semisolid dosage forms for external use containing hydrophilic or hydrophobic base with gelling agents
5. **Poultices:** Semisolid dosage forms for external use containing medicaments applied to the skin to hold the dressing and protective

Gaseous Dosage Forms

1. **Aerosols:** Suspension of fine solid or liquid particles with the gas used to apply the drug to the respiratory tract having an atomizer within the device
2. **Inhalations:** Internal liquid preparations containing medicaments dissolved in a suitable solvent or if insoluble suspended in the propellant
3. **Sprays:** Gaseous preparations of drugs containing alcohol applied to the mucous membrane of the nose or throat with an atomizer or nebulizer

Need of Dosage forms

- To protect the drug substance from the destructive influences of atmospheric oxygen or humidity (coated tablets, sealed ampules)
- To protect the drug substance from the destructive influence of gastric acid after oral administration (enteric-coated tablets)
- To control the bitter, salty, or offensive taste or odour of a drug substance (capsule, coated tablets, flavoured syrups)
- To provide liquid preparations of substances that are either insoluble or unstable in the desired vehicle (suspensions)
- To provide clear liquid dosage forms of substances (syrups, solutions)
- To provide rate-controlled drug action (various controlled-release tablets, capsules, and suspensions)
- To provide optimal drug action from topical administration sites (ointments, creams, transdermal patches and ophthalmic, ear, and nasal preparations)
- For insertion of a drug into one of the body's orifices (rectal or vaginal suppositories)
- For placement of drugs directly in the blood stream or body tissues (injections)
- To provide optimal drug action through inhalation therapy (inhalation aerosols).

Discussion

Cosmetics are an integral part of human life. As he/she wants to look smart/ beautiful these are very much essential. Like medicines, these Cosmetics also require good quality Raw materials, a Standard process of production, good quality and appealing packaging material to preserve the effect of cosmetics. For this purpose, cosmetics are also included in the D & C Act.

Conclusion

As skin is a very sensitive organ, the quality of cosmetics is essential as these are used externally on the skin's surface and the type of cosmetics depends upon the type of skin.

Extended Learning

- Enlist categorical information about the cosmetics used in daily routine.
- Appreciate Ayurvedic cosmetic products

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MODEL QUESTIONS

Short Answers

- Define Cosmetics. Explain the types of Cosmetics.
- Describe the commonly used raw materials for the cosmetics reparation.
- Classification of Dosage forms
- Write about the Regulatory provisions related to the manufacture of Cosmetics
- Explain the quality control methods for Cosmetics.
- Define Dosage forms. Explain the classification of dosage forms.
- Explain the importance and need of modernised Ayurvedic dosage forms.

CHAPTER 14

GMP (SCHEDULE T) & REGULATORY ASPECTS OF AYURVEDIC DRUGS

PAPER 1

Contents

Brief overview of following

- **Drug and Cosmetics Act 1940 and Rules 1945:** import, manufacture, sale distribution of drugs and cosmetics, standards of quality, misbranded, adulterated, spurious drugs and cosmetics.
- Good Manufacturing Practices (GMP) of ASU, Drugs in accordance to Schedule- T
- Food Safety and Standards Authority of India (FSSAI) and FDA Approval Drugs.

Learning Outcome

At the end of this chapter, Students can able to

1. Explain the legal and regulatory aspects of manufacturing, and sale of Ayurvedic drugs.
2. Describe acts and rules mentioned in Drug & Cosmetic Act 1940 & Rule 1945 and their relevance to Ayurvedic, Siddha, Unani (ASU) drugs.
3. Explain the guidelines of Food Safety and Standards Authority of India (FSSAI) and FDA.
4. Explain long forms of these- (FSSAI) and (FDA), (CCRAS), (DCGI), (CDSCO)

Drugs and Cosmetics Act, 1940

Introduction

The Drugs and Cosmetics Act, 1940 is an act of the Parliament of India which regulates the import, manufacture and distribution of drugs in India. This act was originally known as the Drug Act and was passed in 1940. The original act was prepared in accordance to the recommendations of the Chopra Committee formed in 1930. The related Drugs Rules was passed in 1945. Since 1940, the act has undergone several amendments and is now known as the Drugs and Cosmetics Act, 1940. The Act prohibits the production of inferior or counterfeit pharmaceuticals in the country. The Act requires only qualified and competent personnel to sell and distribute medicines, as well as the manufacture, sale and distribution of drugs.

Adequate regulatory provisions are available under the Drugs and Cosmetics Act, 1940 and Drugs and Cosmetics Rules, 1945 for regulating and monitoring the quality, safety and efficacy of Ayurveda, Siddha, Unani and Homoeopathy medicines in the country. Licensing Authorities are appointed by the State Governments to oversee the enforcement of legal provisions for the manufacturing of ASU drugs. Guidelines for licensing requirements, Good Manufacturing Practices (GMP) and adherence to standards of drugs as prescribed in the pharmacopoeia are mandatory for the manufacturing of

licensed products to ensure quality, safety and efficacy of ASU medicines. Ayurveda, Siddha, Unani Drugs Technical Advisory Board (ASUDTAB) and Ayurveda, Siddha, Unani Drugs Consultative Committee (ASUDCC) are statutory bodies under the Drugs and Cosmetics Act to advise the Central and State Governments on technical matters and for securing uniformity throughout the country in the administration of the Act and Rules there under.

Objectives

The D & C Act was passed in 1940 (10th April 1940), with the main objective of

- Import, Manufacture, Distribution and Sale of drug and cosmetics.
- The act regulates the import of drugs in India, so that no substandard or spurious drug will enter into our country.
- The act prohibits the manufacture of substandard or spurious drug in the country.
- The act provide for the control over the sale and distribution of drugs by only trained and qualified persons.
- The act also provide for the control over the manufacture, sale and distribution of Ayurvedic, Siddha, Unani and Homeopathic drugs.
- Certain provisions of the act regulates the import, manufacture, sale and distribution of cosmetics.
- To have regular inspection of licensed premises by drug inspectors.
- To have control over the standards of drugs & cosmetics by taking samples & analyzing them at approved laboratories.
- To provide special provisions to regulate the preparation, standardization & storage of biological & special products.
- To prescribe the manner of labeling & packing of the various products.

Chapters of the Act

Chapter I	• Introduction and Definitions
Chapter II	• DTAB, DCC, CDL
Chapter III	• Import of Drugs and Cosmetics
Chapter IV	• Manufacturing, Sale, Distribution of Drugs and Cosmetics • Import of Drugs and Cosmetics
Chapter IV - A	• Provisions relating to Ayurvedic, Siddha, and Unani Drugs
Chapter V	• Miscellaneous

Few Major Ammendments

- This act was originally known as the Drug Act and was passed in 1940.
- The related Drugs Rules was passed in 1945. Since 1940, the act has undergone several amendments and is now known as the Drugs and Cosmetics Act, 1940.
- Acts and rules are amended from time to time, the major amendment being made on 1982.
- In 1964, the act was amended to include ASU drugs
- ASU Medicines covered under the Act by inserting Chapter IV A.
- Came into force : 1st February 1983.
- GMP enforced : 7th March 2003.

Important Definitions

1) Drugs

i) All medicines for internal or external use of human beings or animals and all substances intended to be used for or in the diagnosis, treatment, mitigation or prevention of any disease or disorder in human beings or animals, including preparations applied on human body for the purpose of repelling insects like mosquitoes;

ii) Such substances (other than food) intended to affect the structure or any function of human body or intended to be used for the destruction of (vermin) or insects which cause disease in human beings or animals, as may be specified from time to time by the Central Government by notification in the Official Gazette;

iii) All substances intended for use as components of a drug including empty gelatin capsules; and

iv) Such devices intended for internal or external use in the diagnosis, treatment, mitigation or prevention of disease or disorder in human beings or animals, as may be specified from time to time by the Central Government by notification in the Official Gazette, after consultation with the Board;

"Ayurvedic, Siddha or Unani Drugs" includes all medicines intended for internal or external use for or in the diagnosis, treatment, mitigation or prevention of disease or disorder in human beings or animals, manufactured exclusively in accordance with the formulae prescribed in the authoritative books [ASU systems of medicine, specified in the First Schedule].

2) Cosmetics

Any article intended to be rubbed, poured, sprinkled or sprayed on, or introduced into, or applied to the human body or any part there of for cleaning, beautifying,

promoting attractiveness, or altering the appearance and includes any article intended for use as a component of cosmetic.

3) Patent or Proprietary Medicine

1 In relation to ASU systems of medicine all formulations containing only such ingredients mentioned in the formulae described in the authoritative books of ASU systems of medicine specified in the First Schedule,

- But does not include a medicine which is administered by parenteral route and also a formulation included in the authoritative books of ASU systems of medicine specified in the first schedule.

4) Standards of Quality

"Standard quality" means

a) in relation to a drug, that the drug complies with the standard set out in the Second Schedule [Standards of identity, purity and strength specified in the edition of the Indian pharmacopoeia] and

b) in relation to a cosmetic, that the cosmetic complies with such standard as may be prescribed.

5) Misbranded Drugs (Section 33-E)

A drug shall be deemed to be "Misbranded"

- If it is so coloured, coated, powdered or polished that damage is concealed, or if it is made to appear of better or greater therapeutic valve.
- If it is not labelled in the prescribed manner.
- If its label or container or anything accompanying the drug bears any statement, design or device which makes any false claim for the drug or which is false or misleading in any particular

6) Adulterated Drugs (Section 33-EE)

A drug shall be deemed to be "Adulterated"

- If it consists, in whole or in part, of any filthy, putrid or decomposed substance; or
- If it has been prepared, packed or stored under insanitary conditions where by it may have been contaminated with filth or whereby it may have been rendered injurious to health; or
- If its container is composed in whole or in part, of any poisonous or deleterious substance which may render the contents injurious to health; or
- If it bears or contains, for purposes of colouring only, a colour other than one which is prescribed; or

- If it contains any harmful or toxic substance which may render it injurious to health; or
- If any substance has been mixed there with so as to reduce its quality or Strength.

7) Spurious Drugs (Section 33-EEA)

A drug shall be deemed to be "Spurious"

- If it is imported under a name which belongs to another drug; or
- If it is an imitation of, or a substitute for, another drug or resembles another drug in a manner likely to deceive or bears upon it or upon its label or container the name of another drug unless it is plainly and conspicuously marked so as to reveal its true character and its lack of identity with such other drug; or
- If the label or the container bears the name of an individual or company purporting to be the manufacturer of the drug, which individual or company is fictitious or does not exist; or
- If it has been substituted wholly or in part by another drug; or
- If it purports to be the product of a manufacturer of whom it is not truly a product

8) Misbranded Cosmetics

A cosmetic shall be deemed to be "Misbranded"

- If it contains a colour which is not prescribed; or
- If it is not labelled in the prescribed manner; or
- If the label or container or anything accompanying the cosmetic bears any statement which is false or misleading in any particular.

9) Adulterated Cosmetics

A cosmetic shall be deemed to be "Adulterated"

- If it consists in whole or in part, of any filthy, putrid or decomposed substance; or
- If it has been prepared, packed or stored under insanitary conditions where by it may have been contaminated with filth or whereby it may have been rendered injurious to health; or
- If its container is composed, in whole or in part, of any poisonous or deleterious substance which may render the contents injurious to health; or
- If it bears or contains, for purposes of colouring only, a colour other than one which is prescribed; or
- If it contains any harmful or toxic substance which may render it injurious to health; or
- If any substance has been mixed there with so as to reduce its quality or strength.

10) Spurious Cosmetics

A cosmetic shall be deemed to be "Spurious"

- If it is imported under a name which belongs to another cosmetic; or
- If it is an imitation of, or is a substitute for, another cosmetic or resembles another cosmetic in a manner likely to deceive or bears upon it or upon its label or container the name of another cosmetic, unless it is plainly and conspicuously marked so as to reveal its true character and its lack of identity with such other cosmetic; or
- If the label, or container bears the name of an individual or a company purporting to be the manufacturer of the cosmetic which individual or company is fictitious or does not exist; or
- If it purports to be product of a manufacture of whom it is not truly a product.

New Acts Related to Drugs and Devices

In July 2022, the Ministry of Health and Family Welfare released a draft of the Drugs, Medical Devices and Cosmetics Bill, 2022 ("the bill") with an aim of reviewing, replacing and modernizing the obsolescent Drugs and Cosmetics Act, 1940 where the ministry has been persistently reviewing and streamlining the rules to further accommodate the changes and to adopt the new technology. The Ministry of Health and Family Welfare formed an 8-member committee headed by Drug Controller General of India, Mr. V.G. Somani for framing the draft bill, which is now available on the website of the ministry for recommendations and suggestions from public in general and stakeholders. (Link of the Draft is provided below in references section)

SCHEDULE T [Rule 157]
Good Manufacturing Practices for Ayurvedic, Siddha and Unani Medicines

The Good Manufacturing Practices (GMP) are prescribed as to ensure: -

i) Raw materials used in the manufacture of drugs are authentic, of prescribed quality and are free from contamination;

ii) The manufacturing process is as has been prescribed to maintain the standards;

iii) Adequate quality control measures are adopted;

iv) The manufactured drug which is released for sale is of acceptable quality;

v) To achieve the objectives listed above, each licensee shall evolve methodology and procedures for following the prescribed process of manufacture of drugs which should be documented as a manual and kept for reference and inspection.

However, under IMCC Act 1970 registered Vaidyas, Siddhas and Hakeems who prepare medicines on their own to dispense to their patients and not selling such drugs in the market are exempted from the purview of Good Manufacturing Practices (GMP).

Factory Premises

The manufacturing plant should have adequate space for:

i) Receiving and storing raw material.
ii) Manufacturing process areas.
iii) Quality control section.
iv) Finished goods store.
v) Office.
vi) Rejected goods/drugs store.

General Requirements

A. Location and Surroundings

The factory building for manufacture of ASU medicines shall be so situated and shall have such construction as to avoid contamination from open sewage, drain, public lavatory or any factory which produces disagreeable or obnoxious odour or fumes or excessive soot, dust or smoke.

B. Buildings

- The buildings used for factory shall be such as to permit production of drugs under hygienic conditions & should be free from cobwebs and insects/rodents.
- The premises for manufacturing, processing, packaging and labeling will be in conformity with the provisions of the Factory Act.

It shall be located so as to be:

- Compatible with other manufacturing operations that may be carried out in the same or adjacent premises
- To allow orderly and logical placement of equipment and materials to avoid the risk of mix up and cross contamination by other drugs or substances and omission of manufacturing or control step.
- Designed, constructed and maintained to prevent entry of insects and rodents
- Interior surface: Smooth and free from cracks and permit easy cleaning & disinfection. The flooring shall be smooth and even and shall be such as not to permit retention or accumulation of dust or waste products.
- Provided with proper drainage system in the processing area.
- Furnace/Bhatti section could be covered with tin roof and proper ventilation, but sufficient care should be taken to prevent flies and dust.
- There should be fire safety measures and proper exits should be there.
- Drying Space: There should be separate space for drying of raw material, in process medicine or medicines which require drying before packing.

Water Supply

Purified Water shall only be used for all the operations except washing and cleaning operations where potable water may be used. Water shall be stored in tanks, which do not adversely affect quality of water & ensure freedom from microbiological growth.

Disposal of Waste

From the manufacturing section and laboratories the waste water and the residues which might be prejudicial to the workers or public health shall be disposed off Conformity with the requirements of Environment Pollution Control and as per the provision of the Bio- Medical Waste (Management and Handling) Rules, 1996

Ware Housing Area

Adequate areas designed to allow sufficient and orderly warehousing of various categories of materials and products like starting and packaging materials, intermediates bulk and finished products, products in quarantine, released, rejected, returned or recalled, machine and equipment spare parts and change items.

Raw Materials

- All raw materials procured for manufacturing will be stored in the raw materials store.
- While designing containers, cupboard or areas in the raw materials store, care may be taken to handle the following different categories of raw materials-

1. Raw material of metallic origin.
2. Raw material of mineral origin.
3. Raw material from animal source.
4. Fresh Herbs.
5. Dry Herbs or plant parts.
6. Excipients etc.
7. Volatile oils/perfumes and flavours
8. Plant concentrates/extracts and exudates/resins.

Each container used for raw material storage shall be properly identified with the label which indicates the name, source of supply and status of raw material such as 'UNDER TEST' or 'APPROVED' or 'REJECTED'. The label shall also include batch No. or lot No. and the date of receipt of the consignment.

Production Area

The production area shall be designed to allow the production preferably in uni-flow and with logical sequence of operations.

Finished Goods Stores

- The finished goods transferred from the production area after proper packaging shall be stored in the finished goods stores with in an area marked "Quarantine".
- After the quality control laboratory and the experts have checked the correctness of finished goods with reference to its packing/labeling as well as finished product quality as prescribed then it will be moved to "Approved Finished Goods Stock" area.

Quality Control Area

- Quality Control Laboratories shall be independent of the production areas.
- Separate area provided each for pharmacognostical, chemical, microbiological analysis.
- Separate instrument room with adequate area provided for sensitive and sophisticated instruments for analysis.
- Quality control section will have a minimum of

i) One person with degree qualification in A.S.U of a recognized university or Board.

ii) Provided that Bachelor of Pharmacy, Pharmacognosy and Chemistry may be associated with the quality control section.

Ancillary Area

- Rest and refreshment rooms shall be separate from other areas.
- These areas shall not lead directly to the manufacturing and storage areas.

Health, Clothing, Sanitation and Hygiene of Workers

- All workers employed in the factory shall be free from contagious diseases.
- The clothing of the workers shall consist of proper uniform suitable to the nature of work and the climate and shall be clean.
- The uniform shall also include cloth or synthetic covering for hands, feet and head wherever required.

Medical Services

The manufacturer shall also provide-

a) Adequate facilities for first aid;

b) Medical examination of workers at the time of employment and periodical check up there after by a physician once a year, with particular attention being devoted to freedom from infections. Records there of shall be maintained.

Documentation and Records

Documentation is an essential part of the Quality assurance system and, as such, shall be related to all aspects of Good Manufacturing Practices (GMP).

- BATCH MANUFACTURING RECORD
- STANDARD OPERATING PROCEDURES (SOPS)
- RECORDS OF ANALYSIS.
- BATCH PACKAGING RECORDS
- DISTRIBUTION RECORDS
- RECORD OF MARKET COMPLAINTS
- MASTER FORMULA RECORD

Validation and Process Validation

- These has to be done as per the pre-defined protocols.
- These shall include validation of processing, testing and cleaning procedures.

Product Recalls

A prompt and effective product recall system of defective products shall be devised for timely information of all concerned suppliers, up to the retail level within the shortest period.

Complaints and Adverse Reaction

- All complaints there of concerning Ayurveda, Siddha and Unani product quality shall be carefully reviewed and recorded according to written procedures.
- Each complaint shall be investigated/evaluated by the designated personnel of the company and records of investigation and remedial action taken there of shall be maintained.

List of Machinery, Equipment and minimum manufacturing premises required for the manufacture of various categories of Ayurvedic system of medicines

S.No	Category of Medicine	Minimum Manufacturing space required	Machinery/equipment recommend-ed
		1200 Square feet covered area with separate cabins partitions for each activity.	
1.	Anjana/Pisti	100 sq. feet.	Karel/mechanized/motorized kharel. End runner/Ball-Mill Sieves/Shifter
2.	Churna/Nasya Manjan/Lepa Kwatha Churna	200 Sq. feet	Grinder/disintegrator/Pulverisar/ Powder mixer/Sieves/Shifter

3.	Pills/Vatti/Gutika and tablets	100 sq. feet	Ball Mill, Mass mixer powder mixer, granulator, drier, tablet compressing machine, pill/vati cutting machine, SS trays/container for storage and sugar coating, polishing pan, mechanised chattoo (for mixing guggulu)
4.	Kupipakava/Ksara/ Parpati/Lavana, Bhasma/Satva/ Sindura	150 Sq. feet	Bhatti, Karahi/Stainless Steelsels/ Patila Flask, Multani Matti, copper Rod, Gaj Put Bhatti, Muffle furnace End/Edge Runner, Exhaust Fan, Wooden/S.S. Spatula.
5.	Kajal	100 Sq. feet	Earthen lamps for Collection of Kajal, Triple Roller Mill, End Roller, Sieves, S.S. Patila, filling/packing
6.	Capsules	100 Sq. feet	Air Conditioner, De humidifier, hygrometer, thermometer, Capsule filling machine and chemical balance
7.	Ointment/Malaharam	100 Sq. feet	Tube filling machine, Crimping machine/Ointment mixer, End Runner
8.	Pak/Avaleha/Khanda/ Modaka	100 sq. feet	Bhatti section fitted with exhaust fan and should be fly proof, iron kadahi /S.S. Patila and S.S. Storage container.
9.	Panaka/Syrup	150 Sq. feet	Tincture press, exhaust fan fitted and fly proof, Bhatti section, Bottle washing machine, filter press/ Gravity filter liquid filling machine, P.P. Capping Machine.
10.	Asava/Arishta	200 Sq. ft	Same as mentioned above. Fermentation tanks containers and distillation plant where necessary, Filter Press.
11.	Sura	100 Sq. feet	Same as mentioned above plus distillation plant and transfer pump.
12	Arka	100 Sq. feet	Maceration tank, Distillation plant, Liquid filling tank with tap/Gravity filter/Filter press, Visual inspection

13.	Taila/Ghrita	100 sq. ft	Bhatti, Kadahi/S.S. Patila S.S. Storage Containers, Filtration equipment, filling tank with tap/Liquid filling machine.
14.	Aschyotana/Netra Malham	100 Sq. ft	Hot air oven electrically heated with thermostatic control, kettle gas/electrically heated with suitable mixing arrangements collation mill/ ointment mill, tube filling equipment, mixing & storage tanks of stainless steel/of other suitable material sintered glass funnel, seitz filter/ filter candle, liquid filling equipment, auto clave.
15.	Separate area for Bhatti, furnace, boilers, puta, etc. with proper ventilation, removal of smoke, prevention of flies, insects, dust etc., have tin roof.	200 Sq. ft	

General GMP (Good Manufacturing Practice) rules holds good even for the manufacturing of Rasoushadhis. In addition specific guidelines for the manufacturing of Rasoushadhis have provided through the Gazette Notification issued under the Drugs & Cosmetics Rule 1945 with G.S.R. No.157(E) Date: 04.03.2009. The Final Notification has been issued on 4th March, 2009.

1. Specific Requirements For Manufacturing of Rasaushadhis

The guidelines are to provide general and minimum technical requirements for quality assurance and control in manufacturing rasaushadhis (Herb-mineral-metallic formulations). These guidelines deal with Bhasmas, satwa (of Metals and Minerals origin) used in Ayurveda, Siddha and Unani Medicines.

The GMP guidelines for Rasaushadhis are needed to establish the authenticity of raw drug minerals and metals, in process validation, quality control parameters to ensure that these formulations are processed and prepared in accordance with classical texts and for which safety measures are complied. Only those manufacturing units which have Good Manufacturing Practices for Ayurveda, Siddha and Unani drugs shall be allowed

to manufacture the same. Good Manufacturing Practices certificate for Rasaushadhis shall be issued by the State Licensing Authority only after thorough inspection by an expert team including Rasashastra experts nominated by the Department of AYUSH.

2. Manufacturing Process Areas

For the Manufacturing of Bhasma, Kupipakawa Rasayana and Rasaushadhi preparations made from metals and minerals, the following specific area shall be provided, which should be completely segregated from the production area used for preparations of plants and animals by product based formulations to avoid cross contamination. The following exclusive area are required for Rasaushadhis.

a) **Bhatti or Heating Device Section for Bhasma and Rasaushadhi:-** 100 sq. feet for heating, burning, puta etc., with proper ventilation, exhaust and chimney. This could be tin shed also.

b) **Grinding, Drying and processing Section for Bhasma and Rasaushadhi:-** 100sq. feet (Manual or mechanical, oven etc.). Drying may be done in an area which is covered by glass or other transparent material to allow sunrays to fall. Drying is done using an oven, at a selected specific temperature.

c) **Rasaushadhi Related Store:-** 100 sq. ft. The size and dimensions of each Bhatti section would be so designed to suit the batch size or quantity of materials to be processed. Keeping in mind the processing is done as per the conditions of Drugs and Cosmetics Act mentioned under Schedule I official books.

In additions to the fuel prescribed in the schedule books namely coal, fire wood, cow dung cakes etc., use of other heating devices e.g. electrical heater, oil gas fired furnace etc., may be employed so as to provide the required temperature as per the nature of material and objective of heating. Depending on the formulation being manufactured, manufacturers may adopt aerobic or anaerobic process. Properly baked and clean earthen pots or other crucibles and glass containers of appropriate design shall be used.

The manufacturing areas should be designed with special attention to process the products that generate toxic fumes like SO_2, arsenic, mercury vapour etc,. When heating and boiling is necessary, suitable ventilation and exhaust mechanism should be provided to prevent accumulation of fumes and vapors. Such areas may be provided with properly designed chimneys or ducts fitted with exhaust systems. Suitable scrubbing system should also be provide to remove fumes and smokes, these measures serve the purpose of safety personnel and environment.

Since processing of Rasaaushadhi may induce heavy metal contamination and cross contamination etc., cleaning of equipment is particularly important after every process using appropriate cleaning agent which should not react with the material of equipment and must be free from unwanted properties e.g. corrosiveness.

Records shall be maintained specially for temperatures attained during the entire process of Bhasmikarana, while employing different kinds of classical puta, furnace using oil, gas or electricity. Appropriate temperature measuring instrument should be employed such as pyrometer and pyrograph for manual reading or recording by heat sensors, connected to the computer.

In order to handle large quantities, appropriate technology like use of hand operated extruders for making chakrikas or pellets may be adopted. However, equipments and made of aluminum or its alloys should not be used.

Access to manufacturing areas shall be restricted to a minimum number of authorised personal only.

3. Quality Control

A. In Process Quality Control

The registers as indicated below should exclusively be maintained for ready reference:-

a) **Shodhana Register with following details:**

1. Sl.No.
2. Batch no. and Size.
3. Date, time and duration.
4. Name of the Raw-material with Quality reference and quantity.
5. Quantity of Shodhana Dravya.
6. Book reference followed.
7. Methodology.

b) **Bhavana and Puta Register with following details:**

1. Sl.No.
2. Batch no. and Size.
3. Date, time and duration.
4. Name of the material with quantity of starting materials.
5. Quantity of nirvapya Dravya.
6. Quantity of Bhavana Dravya.
7. Date and Time of starting and completion of Bhavana or Mardana and duration.
8. Type and Number of Putas.
9. Time and Date of completion of Putas.

10. Colour and texture of the products or standards.
11. In process tests followed (Bhasma Pariksha and any other tests).
12. In case heating at a particular temperature is required, record of attainment of that temperature.

c) **Grinding Records Register: (Finished Products/Intermediate Procedure):**

1. Sl.No.
2. Batch no. and Size.
3. Date, time and duration.
4. Name of the material with quantity.
5. Name of the equipment (SS/granite).
6. Duration of grinding.
7. Repeat the grinding if required (number of repetition).

d) **Packing Details:**

1. Name of Rasaushadhi.
2. Type of Dosage Form (e.g. Powder, pill tablet etc.).
3. Weight of Rasaushadhis in each unit.

B. Product Quality Control

The specifications for finished Rasaushadhi are primarily intended to define the quality rather than to establish full characterization, and should focus on those characteristics found to be useful in ensuring the quality. Consistent quality for Rasaushadhi can only be assured if the starting material-metals and minerals are used as per pharmacopoeial standards. In some cases more detailed information may be needed on aspects of their process. The manufacture will ensure in-house standards for the uniform quality of products.

Quality testing will be carried out as per official Pharmacopoeia or Schedule books for texts namely, Colour, Taste, varitaratwa, Rekhapurnatwa, Laghutva, Nirdhumatwa, Dantagrekachakacha, Niruttha, Apunarbhava and Nischandratwa.

The Particle size of products should be tested adopting microscope fitted with a micrometre of particle size analyser or any appropriate other techniques. Required physico-chemical characterization of the product should be undertaken by appropriate analytical equipment. The Standard Manufacturing Process of the product should be evolved/followed up. The disintegration time of pills-vati and tablets should also be recorded.

4. Product Recalls

Literature inserted inside the products package should indicate the name, address of the manufacturing unit or email or telephone number for reporting of any adverse drug reaction by physicians or patients. On receipt of such Adverse Drug Reaction report, it will be the responsibility of the manufacturer to ensure the recalling of the product from the market.

Standard operating procedures (SOP) should be included for storage of recalled Rasaushadhis in a secure segregated area, complying with the requirements specified for storage, till their final disposal.

5. Medical Examination of the Employees

Employees engaged in manufacturing should be medically examined periodically at least once a year for any adverse effect of the drug during manufacturing process for which necessary investigations may be carried out for ensuring that there is no effect of material on the vital organs of the employees. Annual examination reports of the employees shall be made available to statuary inspectors during Good Manufacturing Practices inspections.

6. Self- Inspection

The release of Rasaushadhis should be under the control of a person who has been trained in the specificities of the processing and quality assurance of Rasaushadhis. He will be at least a degree holder in Ayurveda/Siddha/Unani medicine or B. Pharma degree holder in Ayurveda/Siddha/Unani medicine.

7. Dosage form of Rasaushadhis

The Rasaushadhis may be made into acceptable dosage forms such as, churna, vati, gutika, tablet, capsule etc. after adding suitable permissible fillers or binding agents as permissible under the Ayurvedic Pharmacopoeia of India or Indian Pharmacopoeia as updated from time to time. In such cases the label must indicate the Ayurveda/ Siddha/Unani medicine in a Tablet or Pill or Capsule in addition to the fillers. The crystalline product may be ground before packing in the individual dispensing size. All the Rasaushadhis shall be packed in a dosage form which is ready to use for the consumer. Grinding and weighing of individual dose of potentially poisonous products will not be permissible in patient consumer pack. This arrangement may reduce the Adverse Drug Reaction of Rasaushadhis which takes place due to dose variation. However for hospital utility, this label will not be applicable and it will clearly indicate the "Hospital Pack".

8. Area Specifications/requirement for an applicant companies only to have GMP of Rasaushadhis of ASU medicines

S.No.	Category of Medicine/ Manufacturing area	Minimum Manufacturing space required (1500 sq. ft.)	Machinery equipment recommended
1	Pisti/Grinding area for Bhasma. Phisti.	100 sq. ft.	Khalva/mechanized/motorized Khalva, End runner/Ball-Mill Sieves/Sifter
2	Powdering area for raw drugs of plant origin giving in Rasaushadhis.	200 sq. ft	Grinder/Disintegrator/Pulveriser/Powder mixer/sieves/ Sifter
3	Pills/Vati/Gutika and tablets.	100 sq. ft	Ball Mill, Mass Mixer/Powder mixer, Granulator drier, tablet compressing machine, pill/vati cutting machine, stainless steel trays/container for storage and sugar coating, polishing pan, mechanized chattoo (for mixing of guggulu) where required.
4	Kupipakva/Kshara/ Parpati/Lavana, Bhasma, Satva	150 sq. ft.	Bhatti/stainless steel vessels/ Multani Mitti/plaster of Paris, Copper Rod, Earthen container, Gaja Puta Bhatti, muffle furnace, End/Edge Runner, Exhaust Fan, Wooden, S.S. Spatula.
5	Receiving and storing raw material	200 sq. ft.	
6	Quality Control Section	150 sq. ft.	
7	Quarantine/observation	50 sq. ft.	
8	Finished goods store	150 sq. ft.	
9	Rejected Goods Store	50 sq. ft.	
10	Bhatti-Puta Area	200 sq. ft.	
11	Area for water and washing etc.	50 sq. ft.	
12	Office	100 sq. ft.	
	Total	**1500 sq. ft**	

Food Safety and Standards Authority of India (FSSAI)

The Food Safety and Standards Authority of India (FSSAI) has been established under Food Safety and Standards, 2006 which consolidates various acts and orders that have hitherto handled food related issues in various Ministries and Departments. Ministry of Health & Family Welfare, Government of India is the Administrative Ministry for the implementation of FSSAI. FSSAI has been created for laying down science based standards for articles of food and to regulate their manufacture, storage, distribution, sale and import to ensure availability of safe and wholesome food for human consumption.

Food Safety and Standard (FSS) Act, 2006

FSSAI has been mandated by the FSS Act, 2006, which aims to establish a single reference point for all matters relating to food safety and standards, by moving from multi- level, multi- departmental control to a single line of command. To this effect, the Act establishes an independent statutory Authority- the Food Safety and Standards Authority of India with head office at Delhi. Food Safety and Standards Authority of India (FSSAI) and the State Food Safety Authorities shall enforce various provisions of the Act.

Functions of FSSAI

- Setting Rules and Guidelines
- Granting License
- Test the Standard of Food
- Regular Audits- Proper inspection is done for food-producing and manufacturing companies to ensure the standards are at par with the guidelines
- Spreading Food Safety Awareness
- Maintain Records and Data
- Keeping the Government Updated

FSSAI and Ayurveda

- Ministry of Ayush and Food Safety & Standards Authority of India (FSSAI) under MoHFW, India's apex body for food regulation has formulated regulations of safety & quality standards for food products under 'Ayurveda Aahara' category.
- This comprehensive initiative will ensure manufacturing of quality Ayurveda food products and help in expanding the international market for Make-In-India products.
- According to the regulation, manufacturing and marketing of 'Ayurveda Aahara' products will now adhere to strict Food Safety and Standards (Ayurveda Aahara) Regulations, 2022 rules and will be available in market only after license/approval from FSSAI.
- Ayurveda aahara can be termed as the food prepared as per steps using the same recipes or ingredients and/or processes as per the procedure described in the Ayurveda books which are listed under 'Schedule A' of these regulations.

- It also includes all those products which consist of botanical ingredients as per the rules and concept of Ayurveda Aahara.
- It does not include Ayurvedic drugs or proprietary Ayurvedic medicines and medicinal products, cosmetics, etc. listed under schedule E of the Drug and Cosmetic Act, 1940 and rules 1945.
- Food recipes and ingredients for promoting health, specific physiological needs, and foods specified for consumption during or post specified diseases, disorders referred as Pathya in Ayurveda are covered under these regulations.
- However, 'Ayurveda Aahara' will not include Ayurvedic drugs or proprietary Ayurvedic medicines and medicinal products, cosmetics, narcotic or psychotropic substances and herbs.
- Further, Ayurveda Aahara is also not recommended to young children below age 2 years.

Ayurveda Aahara Regulations

As per the regulations, the manufacturing and marketing of "Ayurveda Aahara" products will now be regulated strictly as per the Food Safety and Standards (Ayurveda Aahara) Regulations, 2022. And Ayurveda Aahara products will be available in the market if they have license/approval from FSSAI.

1. All those food recipes and ingredients mentioned in the book which promoted health, physical needs and food mentioned to consume during or after the disease, or disorders can be called "Pathya", which is also regulated under these regulations.
2. Under the Ministry of Ayush, an expert committee is formed which consists of relevant experts, and FSSAI representatives who are helping by providing their advice on approval of claims made and also addressing the issues related to registration, licensing, certificates, testing, and quality of Ayurveda food products.
3. **Requirements of labelling along with logo**: A special logo has been designed for the Ayurveda Aahara, a category so that the Ayurveda aahara products can be identified easily and can support the quality of Ayurveda food products.

4. The labelling of 'Ayurveda Aahara' shall specify the intended purpose, the target consumer group, recommended duration of use and other specific requirements. Health claims and disease risk reduction claims for the different categories of 'Ayurveda Aahara' and their approval process shall be in accordance with the requirements specified in regulations.
5. It will be mandatory for manufacturers of Ayurveda food products to display the logo with the warning stating "strictly for dietary purpose and use" on the label.
6. The labeling should have a warning or precautions wherever necessary about the side effects if any;

7. A warning about the way of consumption of product whether oral consumption or any other use.
8. The regulations also stated that no one is allowed to market the products with claims of treating or curing the diseases. Thus, no advertisement or label on Ayurveda food products can claim that they have the power to cure or treat any human disease.
9. Even if still manufacturers want to claim that their product can "reduce the disease risk" then they have to take "based on evidence prior approval" from the food safety authority of India. For any claims related to health, no such approval would be required if the claims have evidence from the Ayurveda texts.
10. **Regulations for Additives:** The regulations also consist of a list of additives that are permitted to use in Ayurveda Aahara. It is also stated that vitamins, minerals, and amino acids cannot be used in these products. The manufacturer needs to make a declaration on the natural presence of vitamins and minerals in Ayurveda food products. The only food additives allowed to use are mentioned in schedule C of these regulations.

Food and Drug Administration (FDA)

The United States Food and Drug Administration (FDA or US FDA) is a federal agency of the Department of Health and Human Services. The FDA is responsible for protecting and promoting public health through the control and supervision of food safety, tobacco products, caffeine products, dietary supplements, prescription and over-the counter pharmaceutical drugs (medications), vaccines, biopharmaceuticals, blood transfusions, medical devices, electromagnetic radiation emitting devices (ERED), cosmetics, animal foods and feed and veterinary products.

Food and Drug Administration (FDA), agency of the U.S. federal government authorized by Congress to inspect, test, approve, and set safety standards for foods and food additives, drugs, chemicals, cosmetics, and household and medical devices. The Food and Drug Administration (FDA) is responsible for protecting the public health by assuring the safety, efficacy, and security of human and veterinary drugs, biological products, medical devices, our nation's food supply, cosmetics, and products that emit radiation. The FDA also provides accurate, science-based health information to the public.

It regulates all foods and food ingredients introduced into or offered for sale in interstate commerce except for meat, poultry and some egg and catfish (which are regulated by USDA); ensures the safety and effectiveness of all drugs, biological products (including blood, vaccines and cellular and gene therapy products), medical devices, and animal drugs and feed; and makes sure that cosmetics and medical and consumer products that emit radiation do no harm.

FDA approval of a drug means that data on the drug's effects have been reviewed by CDER (Center for Drug Evaluation and Research), and the drug is determined to provide benefits that outweigh its known and potential risks for the intended population.

Other Important Organisations

1. The Central Drugs Standard Control Organisation (CDSCO)

- It is India's national regulatory body for cosmetics, pharmaceuticals and medical devices.
- CDSCO under Directorate General of Health Services, Ministry of Health & Family Welfare, Government of India is the National Regulatory Authority (NRA) of India.
- Under the Drugs and Cosmetics Act, CDSCO is responsible for approval of Drugs, Conduct of Clinical Trials, laying down the standards for Drugs, control over the quality of imported Drugs in the country and coordination of the activities of State Drug Control Organizations by providing expert advice with a view of bring about the uniformity in the enforcement of the Drugs and Cosmetics Act.

Functions of the CDSCO

i) Drug approval under the Drugs and Cosmetics Act.
ii) Conducting clinical trials
iii) Setting standards for drugs.
iv) Quality control over drugs imported into the country.
v) Coordinating activities of the state drug control organisations.
vi) Registration of foreign manufacturers of drugs and medical devices whose products are to be imported into the country.
vii) Grant of licences to import drugs by Government hospitals or Medical Institutions for the use of their patients.
viii) Recommend banning of drugs considered harmful or sub-therapeutic under section 26A drugs and Cosmetics Act.

2. The Drug Controller General of India (DCGI)

- It heads the Central Drugs Standard Control Organization (CDSCO).
- Within the CDSCO, the Drug Controller General of India (DCGI) regulates pharmaceutical and medical devices and is positioning within the Ministry of Health and Family Welfare.
- The DCGI is advised by the Drug Technical Advisory Board (DTAB) and the Drug Consultative Committee (DCC).

Functions

i) The DCGI establishes standards for the manufacturing, sales, import, and distribution of drugs in India.
ii) It also regulates medical and pharmaceutical devices.
iii) The DCGI prepares and maintains the national reference standard for drugs.
iv) He is also in charge of the analysis of cosmetics received from the CDSCO as survey samples.

v) The DCGI is also the central licensing authority for medical devices which fall under the Medical Device Rules 2017.

3. The Central Council for Research in Ayurvedic Sciences (CCRAS)

- It is an autonomous body of the Ministry of AYUSH (Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homeopathy), Government of India.
- It is an apex body in India for the formulation, coordination, development and promotion of research on scientific lines in Ayurveda and Sowa-Rigpa system of medicine.
- CCRAS, under the Ministry of AYUSH (Govt. of India) is the Governing and regulatory body for Ayurveda.

Discussion

The increasing use of herbal medicines and the growing demand of the global market for such products has raised concerns on the quality and safety of herbal materials and finished herbal products with the respective national health authorities. Unlike conventional pharmaceutical products, which are usually produced from synthetic materials by means of reproducible manufacturing techniques and procedures, herbal medicines are prepared from materials of herbal origin, which are often obtained from varied geographical and or commercial sources. In addition, they may vary in composition and properties. Furthermore, the procedures and techniques used in the manufacture and quality control of these medicines are often substantially different from those employed for conventional pharmaceutical products. Because of the inherent complexity of naturally grown medicinal plants and the often variable nature of cultivated ones, the examples of contamination with toxic medicinal plants and/or plant parts and the number and small quantity of defined active ingredients, the production and primary processing has a direct influence on the quality of medicines. For this reason, application of GMPs in the manufacture of Ayurvedic medicines is an essential tool to assure their quality.

It is mandatory for the manufacturers to adhere to the prescribed requirements for licensing of manufacturing units & medicines including proof of safety & effectiveness, compliance with the Good Manufacturing Practices (GMP) as per Schedule T & Schedule M-I of Drugs and Cosmetics Rules, 1945 and quality standards of drugs given in the respective pharmacopoeia. Pharmacopoeia Commission for Indian Medicine & Homoeopathy (PCIM & H), a subordinate office under Ministry of Ayush lays down Pharmacopeial Standards and Formulary specifications for Ayurveda, Siddha, Unani and Homoeopathy (ASU&H) drugs within the ambit of Drugs & Cosmetics Act, 1940, which serve as official compendia for ascertaining the quality of the drugs included therein.

Good Manufacturing Practices (GMP) is a comprehensive manufacturing system that ensures product consistency and quality by addressing 5 key components: products, people, processes, procedures, and premises. Implementing Good Manufacturing Practices (GMP) has numerous advantages, including enhanced productivity, profitability, and

risk mitigation. By minimizing waste, it enhances productivity and profitability while mitigating risks associated with recalls, compliance issues, and other problems.

Conclusion:

GMP is a extensive manufacturing system designed to ensure product consistency and quality. It encompasses a multitude of facets, from hygiene and sanitation to quality management, all with the goal of mitigating and ideally eliminating significant risks such as cross-contamination, mislabeling, and process failures. As a result, GMP acts as a protective shield, safeguarding both Life Sciences companies and customers throughout the entire manufacturing process, ensuring top-notch product quality from start to finish.

Extended Learning

- Discuss ethical aspect of large scale drug preparation in Ayurvedic Pharmacies.
- Determine the principles and practice of establishment of Ayurvedic pharmacy.
- Discuss the NABL guidelines for testing laboratory (Chemical).
- Draft of New Acts related to Drugs and Devices. https://health.economictimes.Indiatimes.com/news/medical-devices/new-drugs-medical-devices-and-cosmetics-bill-2022-key-highlights/92852245

References:

- https://cdsco.gov.in/opencms/export/sites/CDSCO_WEB/Pdf-documents/acts_rules/2016 Drugs and Cosmetics Act-1
- https://www.foodsafetymantra.com/ayurveda-aahara/food-safety-and-standard-ayurveda-aahara-regulations-2021/
- https://www.usa.gov/agencies/food-and-drug-administration

MODEL QUESTIONS

Short Answers

- Write the concept of Aushadhi Nirmana shala with context to Good Manufacturing Practices (GMP) in accordance to Schedule T
- Write a short note on : Drug & Cosmetic Act, Rules 1945
- Importance of Drug & Cosmetic Act
- Latest amendments on Drug & Cosmetic Act
- Short note on GMP.
- Short note on Schedule - T
- Short note on FSSAI and FDA
- Define misbranded, adulterated and spurious drugs

Abhraka(Shweta)-Muscovite

Abhraka(Krishna)-Biotite

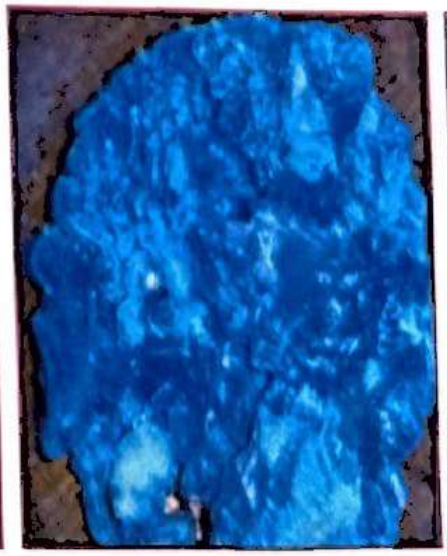
Vaikranta-Tourmaline

Swarna makshika-Chalcopyrite

Vimala- Iron pyrite

Shilajatu- Black bitumen

Karpura shilajatu-Potassium nitrate



Tuttha-Blue vitriol

Chapala-Selenium

Rasaka-Zinc oxide

Rasaka-Zinc Sulphide

Rasaka-Zinc carbonate

Gandhaka-Sulphur

Gairika-Haematite

Kasisa-Green vitriol

Kankshi-Alum

Patra Haratala-Orpiment

Pinda Haratala

Manahshila-Realgar

Sauviranjana-Stibnite

Srotanjana-Antimony sulphide

Neelanjana-Lead sulphide

Pushpanjana-Zinc oxide

Rasanjana-Daruharidrarasakriya

Kankushta-Ruhbarb

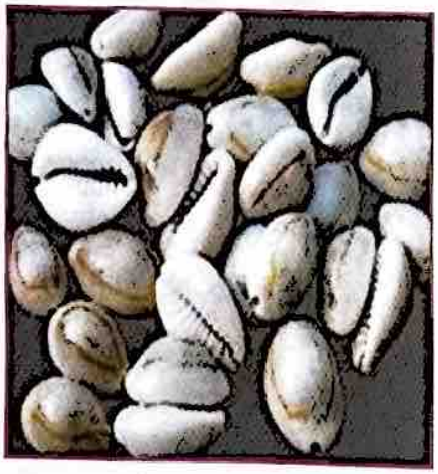
Kampillaka Indian Kamala(fruit)

Kampillaka-Indian Kamala (phalaraja)

Gauripashana-Arsenic trioxide(white)

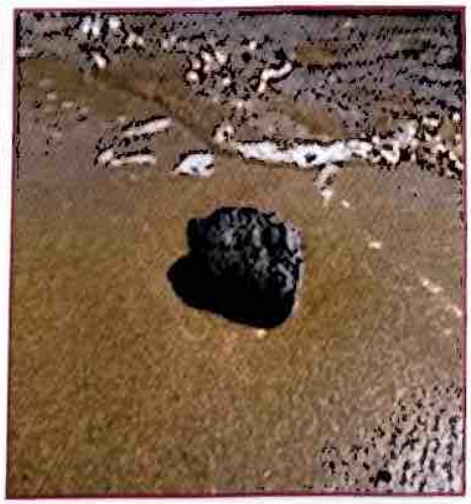
Gauripashana- Arsenic trioxide(yellow)

Navasadara-Ammonium chloride



Kaparda-Cowrie

Agnijara- Ambergris



Agnijara-Ambergris at seashore

Girisindura-Montroydite

Nagasindura

Hingula-Cinnabar

Mriddarashringa-Litharge

Swarna-Gold

Swarna-Gold

Rajata-Silver

Tamra-Copper

Loha-Iron

Naga-Lead

Vanga-Tin

Yashada-Zinc

Pittala-Brass

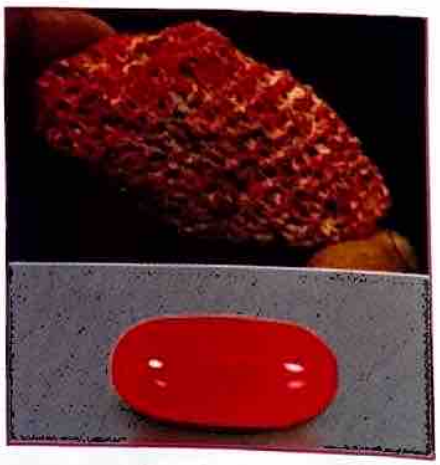
Pittala-Brass

Kamsya-Bronze

Vartaloha-Five metal alloy

Manikya-Ruby

Mukta-Pearl



Pravala-Coral

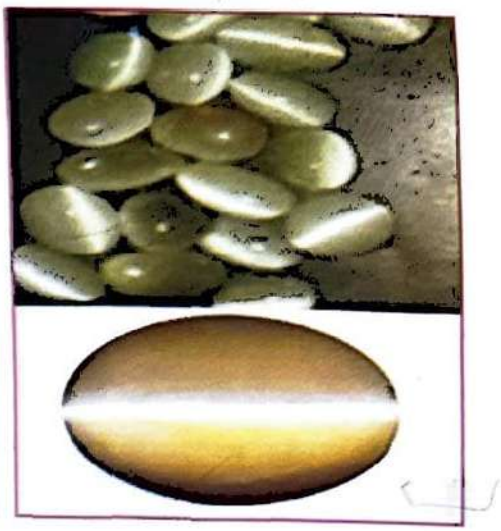
Tarkshya-Emarald

Pushparaga-Topaz

Vajra-Diamond

Nila-Sapphire

Gomeda-Zircon

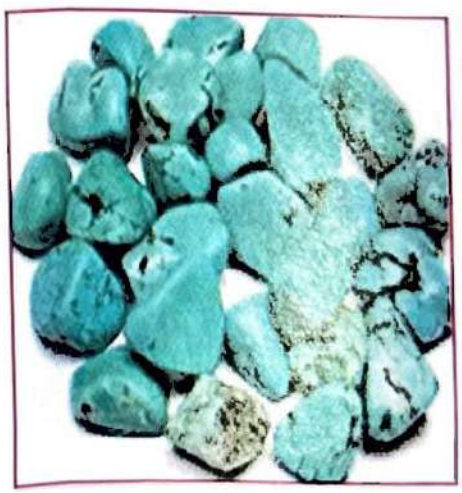


Vaidurya-Cat's eye

Suryakanta-Sunstone

Chandrakanta-Moonstone

Rajavarta-Lapis lazuli



Perojaka-Turquoise

Sphatikamani-Rock crystal

Trinakanta-Amber

Palanka-Onyx

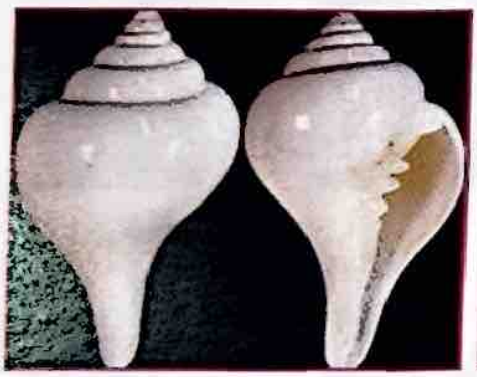
Putika-Peridote

Rudhira-Carnelian

Sudha-Lime

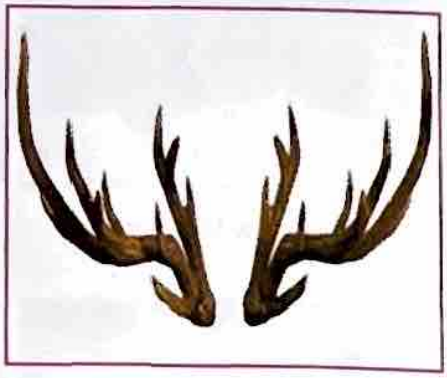
Shukti-Oyster

Shukti-Oyster



Shankha-Conch shell

Mrigashringa-Stag horn



Mrigashringa-Stag horn

Khatika-Chalk

Godanti-Gypsum

Samudraphena-Cuttle fish bone

Kukkutandatwak-Hen's egg shell

Sikata-Silica

Dugdhapashana-Talc

Nagapashana-Serpentine

Badarashma-Silicate of lime

Vyomashma-Jadeite

Kousheyashma-Asbestos

Akika-Agate

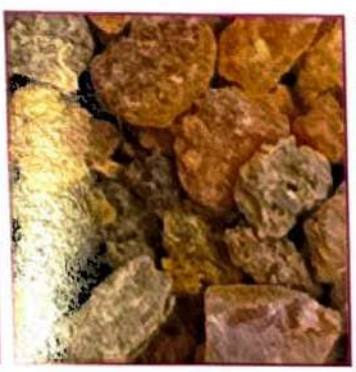
Sarjakshara-Sodium bicarbonate

Yavakshara-Potash carbonate

Suryakshara-potassium nitrate

Tankana-Borax

Mandoora-Iron oxide

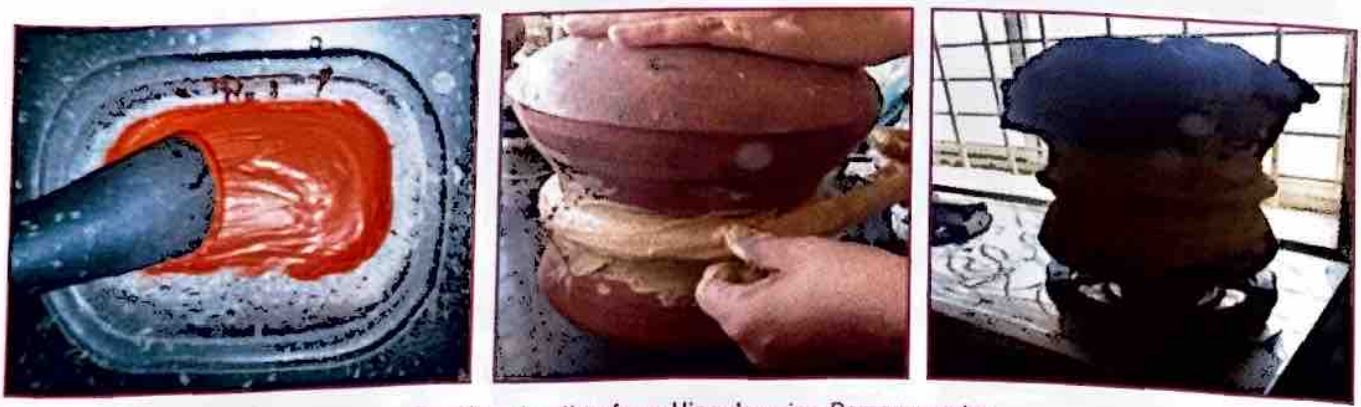


Bola-Myrrh

Sarjarasa-resin of Sal tree

Madhuchishta-Bee wax

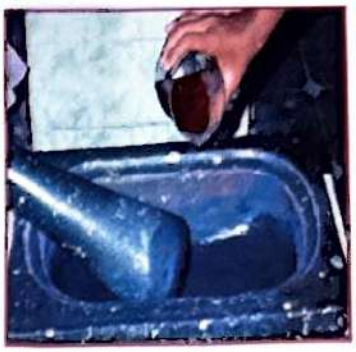
Hingulashodhana by Bhavana method



Parada extraction from Hingula using Damaru yantra

Parada shodhana by Haridra churna and Nimbuswarasa Bhavana

Gandhakashodhana by Bhudhara yantra method

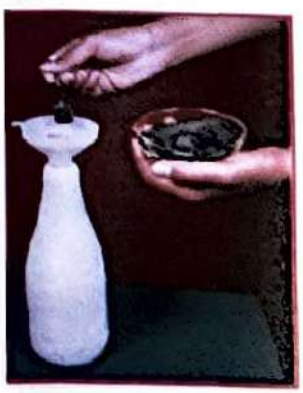


Kajjali preparation

Khalvi Rasayana

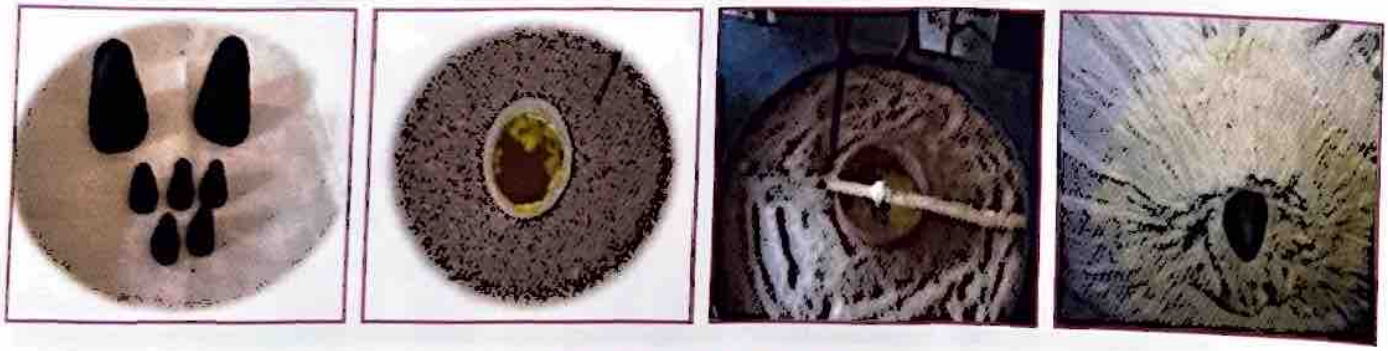
Mugdha Rasa

Preparation of Parpati



Preparation of Kupi pakwaRasayana

Preparation of Kupi pakwaRasayana



Preparation of Pottalikalpa

Manahshilashodhana by Bhavana method

Abhrakashodhana by Nirvapa method

Gandhakashodhana by Dalana method

Gouripashanashodhana by Swedana method

HarathalaShodhana by DolayantraSwedana

Gandhaka Druthi

Vanga Jarana

Shwetha Parpati

Preparation Of Narikelalavana

NavasadaraShodhana

Preparation Of Nimba Kalka

Arjuna Ksheera Paka

Arka Lavana preparation

Laghu Sootha Shekhara Rasa

Sneha paka with Siddhi lakshana